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Continuing the

American Journal of Public Hygiene

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INDEX

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American Public Health Association
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EDITORIALS

ANNOUNCEMENT OF COMMITTEE ON JOURNAL.

TO THE MEMBERS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION:

At the Milwaukee meeting of the American Public Health Association, a resolution was adopted creating a Committee on Journal, and authorizing and directing this committee to provide for the publication of a monthly journal, to be known as the JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION. *To a certain extent this resolution also outlined the scope of the publication and, in a general way, the powers and the duties of the committee having it in charge. The Committee on Journal held its first meeting in the City of Buffalo, on November 18th and 19th, and perfected the details of publication.*

The first issue of the JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION *is now in your hands. Your Committee believes that the Journal has a bright and useful future. Our Association embraces upwards of 700 members, nearly all of whom are actively engaged in public health work in some of its many phases, and to these the Journal will prove invaluable. Our membership covers the entire continent of North America. This has been at once a source of strength and of weakness in the past: of strength, in that it has added to our dignity, extended our influence and broadened our views; of weakness, in that there has been little to hold our members together between annual meetings. Having a journal of our own will increase our strength by still further adding to our membership and it will serve as a means of keeping our members in touch with the Association throughout the year.*

The immediate object of the Journal is to furnish the medium for publication of papers and abstracts of papers presented at the meetings of the general Association and its several sections, together with the proceedings. This, however, is merely the groundwork. The policy of the Journal, as outlined by the resolution creating the Committee and as further elaborated by the Committee itself, will include the publication of papers and reports of associations having representation or affiliation with the American Public Health Association; special editorials, written by men selected by the Committee and by the Managing Editor and dealing with live topics in connection with public health and with questions of interest and importance to the Association; and special articles and abstracts from all available sources. Reviews of important books and papers on sanitation and hygiene will be a prominent feature of the Journal, as will notes on public health work in general.

It is further the opinion of your Committee that the Journal has a distinct field of usefulness in the publication of papers less technical than the run of those read before the A. P. H. A. As matters stand, it is idle to expect at any time in the near future that the thousands of health officers of our counties, our smaller cities, our towns and our villages, will be trained sanitarians before entering office. For this large and important class—constituting at least ninety per cent. of all the health officers of the country—our Journal can be made an inestimable boon. This can be done by devoting part of our space to the publication of concise, non-technical, plainly written, authoritative articles, dealing with the fundamental lessons of modern sanitary science and with practical suggestions based thereon. By doing this our Journal will at once become a necessity to thousands, thereby not only gaining a very considerable list of new subscribers (many of whom would also become active or associate members of the A. P. H. A.), but also rendering to the cause of public health practical service the extent of which can scarcely be overestimated.

The Journal should also constitute the medium for the exchange of experiences and methods between the health officers of the entire country. Discussions of questions of administration, office forms and methods, finance and kindred matters can be made enormously useful to all.

In still another direction it would seem that the Journal should have a large field of usefulness. The worldwide awakening of the people in connection with public health matters has resulted in the organization of a multitude of health associations, societies and leagues, of local, state and national scope, and also in the appearance of many publications actually or ostensibly devoted to public health in some of its many phases. It has further resulted in the publication in the lay press of countless articles along these lines. The people are aroused but at the same time bewildered and confused by the large number of organizations and the enormous output of literature. The Com-

mittee on Journal believes that it has become the distinct duty of the American Public Health Association not only to continue along its former lines but also, as the oldest and the leading organization of health workers in America, to take its place prominently and firmly as a guide to the people in placing before them trustworthy information on health matters. The publication, from time to time, of articles having the stamp of authority and presenting in a popular and attractive fashion some of the plain lessons of hygiene—public and personal—would be of mutual benefit to the people and to the association in whose official organ these articles appeared.

The Committee on Journal unanimously elected as Managing Editor, Mr. B. R. Rickards, who has, under very adverse and trying conditions, shown his ability in connection with the American Journal of Public Hygiene. The Committee regards this selection as a wise one.

The establishment of our own journal marks one of the most radical steps in the history of the A. P. H. A. Your Committee is optimistic in regard to the future of the Journal and of the Association. But thus optimism will be justified only if every member of the Association will do his part towards its consummation. Your Committee has encountered many difficulties and has faithfully sought to do its work well and to discharge the high trust imposed on it by the Association. That its work has been perfect no member of the Committee would for a moment maintain. The fate of the Journal must rest largely with the rank and file of the members of the American Public Health Association. With your assistance the Journal cannot fail to be a great success in itself and in the prominent part which it will play in the further upbuilding of the A. P. H. A. This assistance your Committee bespeaks in behalf of the Journal and in behalf of the Association itself. It is the intention of your Committee to present to you, in our next issue, concrete suggestions as to the most effective ways in which your efforts may be directed.

COMMITTEE ON JOURNAL,

H. W. HILL,
R. M. SIMPSON,
G. T. SWARTS,
WM. C. WOODWARD, *Secretary.*
E. C. LEVY, *Chairman.*

MODERN METHODS OF CONTROLLING THE SPREAD OF ASIATIC CHOLERA.

THERE has been no more striking example of the value of the practical application of modern methods of the prevention of the spread of disease, as compared to older and more antiquated methods, than the manner in which the spread of cholera from the infected localities of Europe to the United States has been controlled.

On former occasions when cholera was present in Europe, the disease either entered the United States or it was necessary to recommend, as in 1892, such extreme measures as the detention of immigrants for a period of twenty days, which practically amounted to the stoppage of immigration and also the exclusion of many articles of merchandise. In view of our knowledge or rather lack of knowledge, of the disease in those days, no one can even now criticize the measures then taken.

Now, however, that the cause of the disease, the *spirillum cholerae asiaticae*, is known, and much is known of the manner of propagation and of the viability of this organism, it cannot fail to afford those interested in such diseases a feeling of satisfaction to observe the scientific manner in which our knowledge is practically applied.

The officers of the Public Health and Marine Hospital Service who are charged by law to prevent the entrance of the disease into our land, must certainly be gratified with the results obtained.

When the cholera first appeared in Russia, in May, 1910, the Surgeon-General was notified by the representatives of our Government who were stationed there; he in turn notified his officers at the various ports in this country and abroad to be watchful, and the course of the disease was followed through Russia, till it finally reached Italy. The Service Officers throughout Europe were notified to enforce strictly the Quarantine Regulations of the Treasury Department. As a result all emigrants bound for the United States from infected or dangerous points were either detained at the port of departure for five days prior to date of sailing, or were kept under observation five days from the date of leaving control stations, and so safe-guarded as to reduce to the minimum any danger of becoming infected, the five days of detention dating from the time that their persons and effects were found to contain no food products which could by any chance convey the infection, and from the disinfection of their baggage. The water and food supply of the ship that was to carry them was also investigated.

Inasmuch as the period of incubation of cholera is five days, it might appear that everything necessary had been done. There still remained, however, further risk, viz.: smuggled food products and bacillus carriers, so the ship's surgeon was required to inspect all immigrants twice daily, punching each person's inspection card at each inspection.

On arrival at the port of entry, the quarantine officer again inspected persons and effects, when if found free from danger the immigrants were landed at the immigration station, where they were again examined in accordance with the Immigration Laws, and the medical examiners of this service were also on the lookout for cholera.

Bacillus carriers have been classified under three heads:

1. The carrier who retains the spirillum in his intestines for a few days only (4 or 5) and then falls sick with the disease.

2. The carrier who retains the spirillum in his intestines from 10 to 12 days, but does not become sick. On very rare occasions this type may carry the spirillum for from 20 to 21 days, but this is very exceptional.

3. The carrier (convalescent carrier) who has had the disease and is convalescent, and who ordinarily retains the spirillum for 10 to 12 days, though in one instance the spirillum was carried for 69 days. This type of carrier; presumably, would hardly be able to travel, as the attack must necessarily have been a severe one.

Inasmuch as the great majority of emigrants from infected territory cannot arrive in the United States, as transportation facilities now are, under an average minimum of eleven days, there will have elapsed, with quarantine and other detentions, a total of 16 to 17 days from the date of departure from the home town to the date of arrival in this country. Therefore, with regard to bacillus carriers themselves, the danger is minimized by the time in transit.

Realizing, however, that all human effort, in spite of the best laid plans, might not be uniformly successful, measures were taken to notify the Secretary of the Board of Health of each State of the arrival in his State of immigrants from infected countries. Immigrant destination cards were therefore prepared which gave the name, place of origin, and the address at destination of each immigrant. These cards are mailed the day the immigrant departs from the immigration station, to the Secretary of the State Board of Health, who forwards them to the municipal health officer at the place where the immigrant is destined. The local health officer then can take such measures as are in his judgment necessary to detect any case that may occur in order to prevent the spread of infection. In view of the preceding, the occurrence of a case of cholera seems extremely unlikely.

To round out finally and complete the plan a precis on cholera, its nature, detection and prevention, giving full data and instructions, has been prepared and published in the Public Health Reports, Vol. XXV, No. 44, November 4, 1910.

Thus, once more, has been demonstrated the value of the practical application of scientific facts, in the protection of the health of the people.

The nearest point outside of the United States to which the disease has spread is Funchal, Island of Madeira. In Italy and Russia the disease has decreased markedly, particularly in Italy, where it has almost disappeared.

Since the reappearance of the disease in Russia in May, 1910, there have been reported officially 237,000 cases, with 99,000 deaths; since its appearance in Italy in August, 1910, in accordance with official reports there have been 1,545 cases with 747 deaths.

It is believed that with the return of spring there will be a recrudescence of the disease in the infected portions of Europe, but inasmuch as there will be no relaxation of preventive measures now in force, it is not believed that there is necessity for apprehension, especially as a demonstration of the value of the preventive measures has already been given.

WALTER WYMAN, Surgeon General,
U. S. P. H. and M. H. S.

Washington, D. C.

A "SCORE SYSTEM" FOR DETERMINING THE REAL RELATIVE IMPORTANCE OF THE DIFFERENT INFECTIOUS DISEASES.

RECENTLY many attempts have been made to give a logical place of precedence to each of the numerous endeavors of the under-manned official public health activities, in order that the most important should be chiefly attacked.

Nevertheless, as Chapin has so well pointed out, the tendency is still to concentrate on the spectacular or new or "catchy" thing and to spend time and money on misdirected efforts to control or abolish the source of one per cent. of trouble, while relatively neglecting the sources of ninety-nine per cent. of it. Many times, out-of-date laws, city charters, etc., actually compel the direction of public health activities along fruitless lines, while public sentiment sometimes demands un-enlightened procedures or diverts efforts in uncalled for channels, to the chagrin and discouragement of the well-informed public hygienist.

Two principal systems for estimating the relative importance of different diseases have been in vogue, i. e., by relative mortality, and by the relative financial losses involved. Both are good so far as they go. But many items, some not expressible in dollars or loss of life should be included. Loss of happiness is perhaps greater than either in the long run.

Mortality alone is no criterion of importance, for we must all die finally, while that principle of political economy which regards finance as the sum total of life may result in an orderly and progressive community, but is likely to insure also that it be an extremely unhappy and restless one.

Here we propose a system of securing the relative values of different diseases similar to that used for "scoring" dairies, the principle of which is becoming of wide vogue in business circles for many different ends.

Thus a skeleton form applicable to every disease might be constructed, providing columns for mortality, morbidity, fatality, degree of curability, degree of danger to others, age incidence, sex incidence, average cost of care of individual cases, loss of time, extent and sequelae, painfulness, permanence of disability, preventability, cost of prevention, and many other items.

Each of these items might be given a total of 1000 which would be "earned" only by the disease highest in that particular item. Then each disease would have placed opposite each item a figure indicating the per-

centage proportion to which it approached the "ideal" in that item. The total score made by any one disease in any one locality, i. e., the sum of these items, would place it in its true relative economic and sociologic position for that locality. For certain items, such as mortality and morbidity, the scoring would be exceedingly simple, for others very difficult. Yet approximations meeting pretty general approval might be arrived at for nearly all the items.

Columns showing the fear which the disease inspired, and the amount of lay attention paid to it, would be of great interest. The pyschology of disease fears, while suggesting at first a leaning towards Christian Science, is of daily practical importance to the professional public hygienist. What public health man does not know that he can spend ten dollars for one case of leprosy to one dollar for ten cases of tuberculosis, and be urged, even forced, to do so, notwithstanding the danger from the advanced tuberculous is far greater than from the leprous?

Who does not know that money and action can be obtained in outbreaks of smallpox, where measles cannot be reached at all—yet, at least in Minnesota, deaths from smallpox (despite very widespread prevalence of the disease) were in 1908 just one third as numerous, while the fatality of measles was at least 12 times as great as that of smallpox.

The high fatality and wide incidence of tuberculosis have caught public attention to a degree which leaves little for other diseases, yet pneumonia runs neck to neck with it in mortality, and exceeds it greatly in incidence—although in many other respects a less injurious disease.

In brief such a score-card would set right many a popular mis-conception—shared in too often by the busy health officer—with too little time for logical comprehension and study of his own work—and it would indicate the points at which the heaviest blows should be struck most quickly to really lessen the burden of infectious diseases.

We would not, however, restrict this system of accounting to the infectious diseases, although it might well begin there.

It is not improbable that some one or more of the non-transmissible diseases, say diabetes, Bright's disease, etc., if thus listed, would prove of greater actual importance than some of those upon which so much time and effort is now concentrated. That the venereal diseases would rank high although heretofore much neglected, goes without saying. That diseases never yet considered seriously in this way would prove just as important as scarlet fever or smallpox (in its present form) is more than probable. At all events such a score system would permit a readjustment of ideas and a placing of public health work on a thoroughly logical basis—the scientific application of available means to the accomplishments of really desirable

ends—securing thus ultimately the ideal of applied science in any line—"the maximum of required returns from the minimum of necessary expenditure."

The complete revolution in ordinary business methods and results everywhere in the last fifteen years has been largely based on the principle of the score card—the determination for each item in the daily work of its true relative position in cost and returns. Public health work should no longer content itself with out of date traditional estimates of the relative importance of different branches of its work.

While the scoring system might well be applied to the infectious diseases, a similar scoring system for ordinary public health activities in other lines would afford some curious results—for instance, the value of work on water supplies, as expressed in time and dollars expended per cases and lives saved thereby, compared with the cost and returns for garbage collection expressed in similar terms.

H. W. Hill.

Minn. State Board of Health.

American Public Health Association

PRESIDENT'S ADDRESS.

By CHARLES O. PROBST, M. D.

Mr. Chairman, Ladies and Gentlemen:

Permit me, at the outset, to express my grateful appreciation of the high honor you have conferred upon me in making me your President. The long and honorable history of this Association, with its list of distinguished men who have preceded me, make it a position which any one may be proud to fill. There is no Association of which I have knowledge that has higher, purer, more unselfish aims.

If this meeting should be as successful as those of the past, it will be largely due to the faithful, arduous labors of those who have so cordially given their aid and support.

It may not be inappropriate to sketch in briefest terms the history of this Association. It is not unlikely that many here are unfamiliar with it.

Organized in New York City in 1872 by a few men who even at that early date had prescience of the supreme importance to this country of conserving the public health, it has been more or less closely associated with, and responsible for most of the great advances in public health work.

In 1885, our great and growing neighbor to the North joined hands with us, thus breaking down National barriers, never respected by disease.

In 1890 that wonderful republic of Mexico became a part of us. Wonderful indeed has been their progress in sanitation. Those of us who attended the meeting of this Association in Mexico in 1892, and again in 1906, were amazed and delighted to see the immense strides along public health lines that our southern friends had made. While this has been largely due to the tireless energy and far-seeing mind of Dr. Liceaga and his confreres, heartily supported and aided by that most remarkable among the world's rulers, President Diaz, I believe that our Mexican friends would cordially and gratefully admit that the source of their inspiration originally was the American Public Health Association.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 7, 1910.

Later, in 1898, Cuba, with which this country has been so intimately connected, came in. Cuba, which in times past has been so great a menace to our southern states, that an honored member and former president of this Association before our war with Spain for her liberty, strongly advocated the justice of forcible annexation for our protection against yellow fever.

It was this Association, through its committee on yellow fever, which induced President McKinley to bring the matter of its investigation before Congress, and paved the way for the wonderful work of Reed and his associates—members of this Association—who, in discovering the true cause of this dreaded pest, have freed Cuba from a worse fate than Spanish domination, and given her unrestrained intercourse with the world. It was this discovery that made possible the Panama Canal, where Gorgas, who is also one of us, has turned the deadly canal zone into a health resort.

Still broadening its activities, and taking cognizance of the wonderful discoveries in bacteriology in relation to disease, the Laboratory Section, in 1901, was formed. Its work in standardizing methods for water, air and milk examination, to speak of nothing else, has been recognized and largely adopted, throughout the world.

Wilbur, our indefatigable delver in berth and death returns, has helped us to form a Section on Vital Statistics. To him and other members who have worked with him, is due the credit of having proposed an International classification of diseases which has been adopted throughout the greater part of the world.

Lastly, in 1906, there was added the Section of Municipal Health Officers. This youngest branch, dealing with practical health measures to be enforced by executive men in our large centers of population, bids fair to rival all other health agencies in accomplishing results that may be seen and measured.

Such, in the briefest words, is the American Public Health Association. One might easily extend the account of its many and varied achievements far beyond the hour of this address. Its thirty-six volumes of transactions, comprising some 15,000 pages, is a full history of the important discoveries and activities in health matters during a third of the century.

To-day greater things seem possible. Seeds sown years ago are sprouting. A renaissance in health is at hand. Never before has the public shown such interest and enthusiasm in health measures. Never has it so nearly reached a realization of the immense possibilities in preventing sickness and prolonging life. Perhaps even those of us long in service are seeing as never before how closely health problems are tied up with all the great sociological problems of the day.

The time is ripe for co-operation! Cooperation of the widest sort.

A glance at our program will show that an attempt has been made to bring together at this meeting representatives of different National associations more or less directly concerned with public health questions. Other National associations, not represented or invited, might well be included. Further on an attempt will be made to show that, fundamentally health is a more direct end to their labors than at first glance appears.

Without attempting to even outline a plan for co-operation, or to indicate how this may be brought about, the President would respectfully recommend that by committee or otherwise the question be investigated of the possibility of uniting or concentrating the efforts of the different National organizations in the four countries represented whose work concerns in any large measure the promotion of the Public Health.

I shall have occasion to refer to this again under the major theme of my discourse, which is, Work, Rest and Play in their Relation to Health.

Man's hours naturally divide themselves into these three periods, of work, rest and play. Many of the great social movements of today rest solely upon the question of increasing the hours for rest and play by diminishing the hours for work. It vitally concerns, but from different viewpoints, working-men, working-women, and working-children. The fact that, "All work and no play makes Jack a dull boy," has become, indeed, a National problem.

Let us first consider the individual as regards work, rest and play, before turning attention to great social classes, or individuals en masse.

It may be primarily observed that all Nature marks the necessity for rest to follow toil. In every part of our globe night follows day, and where activities are greatest, this is diurnal.

The seasons mark well these three periods. Summer is the working period of vegetable growth when the earth, stimulated by the sun, transmutes in her wonderful soil laboratory the inorganic into the organized products that feed her children. After the harvest cometh rest, or the long sleep of winter. Awakening for a period of fresh toil comes first a period of playfulness, or springtime, with its wealth of happy, warbling birds, sweet flowers, and the rippling brooks from the melting snows of winter.

So should the wise man divide his time if he would reach the fullness of life here below.

Whatever our individual beliefs as to a life beyond the grave, all normal men will agree that the greatest possible prolongation of this life, while power to work and enjoy remains, is the greatest blessing earth affords.

It is but natural that the individual should struggle for this blessing for himself, and in this struggle he may unavoidably stand in the way of an individual less strong. But the one who thoughtlessly, ruthlessly shortens the life of another, or unnecessarily deprives him of needed rest or happiness he might otherwise have had, is an enemy to society.

Play marks the life of all young beings under normal conditions. This has a deeper significance for children than many suppose. Not only does it tend to their proper physical development, aiding the harmonious growth of every organ, but it enters into their mental and moral makeup.

It should not only appeal to our sympathies that many children have no opportunity to play, but should concern us as a Nation depending upon our boys and girls to support and carry forward the basic ideas of government.

Play, or amusement, which is but another form of play, is just as necessary for the "grownups." Perhaps no greater problem confronts the individual than how to best divide his time (and money) between work, rest and play so as to get the greatest amount of good out of life.

How many wrecked and wretched lives do we see when either work or play has been the sole object of existence.

This individual devotes his whole time to making money, never stopping to enjoy the innocent pleasures of life, consoling himself with the thought that later he can buy all the happiness he wants. He may, if he quits work in time, purchase certain pleasures, but it is doubtful whether he can ever purchase real happiness. Often the end is a complete physical or mental breakdown, and he realizes too late that he has sold his birthright for a mess of pottage.

Some of our late railroad kings might be mentioned as prominent examples of such failures in life.

The obverse side is even worse. To make life all play is usually to miss all true happiness, and may often lead, through almost unavoidable temptations in an effort to find it, to utter wretchedness and premature death. The prisoner in Matteawan, whose doings recently shocked the reading world, shows where unbridled play without responsibility may lead one.

Although work was the curse that was laid upon the disobedient one who was driven from Paradise, we must believe that what was meant was work without play, which is still the condition of millions of our fellow men.

It might well be a function of this Association to help remove this curse, and to give to man greater opportunity for the pursuit of health and happiness.

If I may be permitted to offer a word of advice to the individual, fortunate enough to be able to control his time in part, it would be to put play, or amusement into his DAILY life.

The tire even of the man whose daily toil is practically all muscular, is in part nerve tire. He needs not only rest, but amusement. Much of the alcoholic excesses of the working-man in this country is due to this instinctive longing for play or amusement after work and rest.

May the comparative temperance of most European countries not be due to the greater opportunities they provide for innocent, out-door amusements? Do we quite realize what accessible parks with bands of music-good music—mean to the factory slave?

When I see eight or ten thousand people gathered together some Sunday afternoon for a game of baseball, I have little patience with those who would suppress it without offering some other outlet for the spirit which demands something more than toil and rest. The worst feature of it is that it leaves, usually, the wife and children at home, who may be equally in need of an outing.

If we look upon the national health as an asset, as, indeed, our greatest source of national wealth, we, as health men, must be interested in providing ample opportunity for national play of the right sort. While our efforts up to this time have been largely directed to what may be called the negative side of the question—that is, preventing or removing conditions directly injurious to health, we must, if we would cover the whole field, give attention to the positive side by encouraging conditions that promote health. One of the essential things that should be considered in a large way, is to provide for the masses time, place and opportunity for play and amusement.

If moral prophylaxis comes within the scope of Social Hygiene, this question of providing suitable amusement for the working people becomes of greatly increased importance. Especially is this true for working girls. The lack of such places in large cities is among the chief causes of the social diseases.

It is a pleasure to note that in the city where we are gathered, under the present administration, the dangerous dance-hall as an adjunct of the saloon, has been closed, and the school houses opened, under proper supervision, for amusement and association which all healthy (normal) individuals demand as their right. In the interest of health as well as morals, this movement is to be encouraged in every way possible.

Turning now to the larger side of the question, let us consider more in detail some of the great national movements and see what relation they have to my subject, work, rest and play in relation to health. We naturally will begin with the child and the organizations to promote its welfare.

I might say, parenthetically, that I am becoming more and more of the opinion that the child must be the starting point for all great reforms.

Few men or women radically change their habits or opinions. (We must always accord to the gentler sex the right to change their minds.)

In a little pamphlet published this year by the charity organization department of the Russell Sage Foundation, giving information about sixty-seven organizations concerned in social movements, ten are named that deal with children. The list does not pretend to be complete. It does not include The American School Hygiene Association, for instance, which we hoped would be represented at this meeting. None of these children's organizations is included under the subdivision, Health, in which, however, fourteen other organizations are listed.

First may be mentioned the Playground Association of America, established in 1906. Its purpose, to quote from the pamphlet mentioned, is, "To increase the efficiency of playgrounds already established and to establish playgrounds on the right basis in cities and towns not having them, that eventually every citizen shall have opportunity for wholesome recreation."

You will please note that while this is listed as a children's organization its final purpose is said to be to give EVERY citizen an opportunity (meaning place) to play, which would immensely broaden the field of its operations.

Perfect physical development, which the playground lends aid to, is the foundation for perfect health. When we recall that in the United States alone there are some twenty-five millions of children between the ages of 5 and 18 years, the age for active play; and that a large part of these are in crowded and fast growing cities, the far-reaching importance of the playground movement, even if limited to children, becomes apparent to those with eyes for the future.

The Department of Child Hygiene of the Russell Sage Foundation, established in 1908, occupies a part of this field. Its purpose in part is said to be, "To conduct researches and promote activities favorable to the physical, moral and intellectual welfare of children, especially public recreation and the health and progress of school children." It is also interested in school athletic leagues, play festivals, medical inspection of schools, open-air schools, and school feeding.

The American School Hygiene Association, organized in 1905, has for its sole object the health of school children. Schoolhouse construction, courses and hours of study (that is work), medical inspection, in sum, all the conditions favorable or unfavorable to the healthy growth of school children, it seeks to promote on the one hand, or remove on the other.

Should not these be classed as HEALTH organizations?

But children must have more than merely a PLACE to play. They must have the time. An association that seeks indirectly to bring this about is the National Child Labor Committee, organized in 1904

This question has been considered by the Congress of the United States, and has been the subject of legislation in most of the individual states.

It is unnecessary here to go into the subject and its many ramifications. Child labor under present conditions seems necessary. That it should be more strictly regulated all will concede. The plea I would make is that the working child should have ample time and a place for play, and that its work should be of such character and of such duration that it is not too tired to play.

There is another phase of the child labor question that scientific, industrial hygiene should more fully consider. At what age shall the child quit play and go to work? This has been defined by law in most states on a chronological basis. It has been pointed out by recent investigators that the anatomical age of a child may not correspond to its age in years. The development of the bony structure may be retarded in one and advanced in another child of the same number of years. This is well shown by an X-Ray examination of the small bones of the wrist.

It is surmised, if not proven, that great harm may be done to an anatomically undeveloped child if permitted to do labor requiring considerable and continued muscular effort.

While it may be impracticable to require an X-Ray examination of every child before permitting it to labor, laws regulating the age of permissible child labor should take this into account in fixing this age. We all must wish that the happy play days of childhood shall be prolonged as far as possible.

Here then we have a group of organizations, and there may be others, deeply, if not chiefly concerned with the health of children. The measures all must employ to carry out their purposes are largely if not wholly educative and legislative. Evil conditions are to be removed on the one hand, and on the other, conditions favorable to the health and welfare of the child be restored or provided. Does this not afford opportunity for effective co-operation?

Another phase of the work, rest and play problem, is the demands of National labor organizations for an 8-hour day. Whether this period for all forms of physical labor and for both sexes is a correct physiological standard, I do not pretend to say. That shorter work hours would not always result in longer rest hours or play hours of the right sort, would doubtless be true in many cases. That the leisure hours so afforded could,

by proper direction and the opportunity, be turned into channels that would improve both the physical and moral welfare of workingmen and women cannot, I think, be doubted.

Certain of our industries are necessarliy operated night and day including Sundays. Recent investigations have shown that in some of these men work 12 hours a day continuously for long periods. That this condition is inimical to health and should be prevented so far as possible will hardly be disputed. Legislation along this line, properly directed, is to be commended.

Studies have been made that seem to show that over-fatigue makes an individual more susceptible to the infectious diseases, and perhaps other maladies. Nervous diseases, said to be on an increase among working-men, have been attributed to this. A commission in France, that is looking into the causes of industrial diseases, is making an investigation of this subject.

So far we have considered only such organized movements as have to do with public health problems from the standpoint largely of a proper apportionment of hours between work, rest and play.

There remain a number of National organizations having health or the prevention of disease as their prime object with which, it seems to me, we should seek a closer communion. First of all for this country, perhaps, should be mentioned the American Medical Association.

This Association stands for the highest possible standards in Public Health. In various ways it has given weighty support to many health movements for improving general health conditions, and notably in the interest of pure food and the establishment of a National Health Department. Individually, with few exceptions, its members in their respective communities have given freely of their time, and often money, in defense of the public against disease. The family physician must long remain the chief instructor and most potent factor in preventing the spread of dangerous infectious diseases.

The National Association for the Study and Prevention of Tuberculosis, organized in 1904, has made itself known throughout the world. Many, if not the majority of the members of this Association, are among its members. It is with very great pleasure that I announce the presence of its very efficient secretary, who will speak of its operations and its relations to this Association.

Another health association which might have been mentioned in speaking of children, is the American Association for the Study and Prevention of Infant Mortality. The name plainly indicates its purpose.

The American Society of Sanitary and Moral Prophylaxis aims to limit the spread of diseases which have their origin in the social evil. This subject, which some have said to be of more serious import than the suppression of the great white plague, was made special mention of by the last president. A symposium on Social and Moral Prophylaxis has been arranged for this meeting, and we have with us a represenattive of the American Society of Sanitary and Moral Prophylaxis to tell us of the work of this organization.

A Commission on the Prevention of Blindness of the Russell Sage Foundation was established in 1908. It proposes to conduct a National campaign for the prevention of blindness. This subject has been ably presented to this Association on more than one occasion, and concerns us nearly.

Among the National organizations for which the promotion of health is an indirect object may be named the National Conference of Charities and Correction. Health and sanitation are named as a part of its purpose. If in health, "prevention is worth a pound of cure," the same ratio should hold for charity. If we could prevent all unnecessary sickness and premature death there would be comparatively little need for charity. This organization must therefore be vitally concerned in the work of the American Public Health Association.

Among the subjects to be presented at this meeting is the Prevention of Imbecility. The subject of eugenics is claiming much attention from the educator and the social hygienist, and may well receive consideration and encouragement from this Association. There is a National Association for the Study of Feeble Mindedness, although prevention is not mentioned as one of its objects.

The American Housing Association, recently formed, would bring about domiciliary reforms. Certainly we all recognize the baneful effect upon health of tenement-house conditions, and how largely overcrowded and unsanitary dwellings enter into the production of tuberculosis and other preventable diseases. We shall receive with great cordiality, I am sure, an account of their plans and purposes from their representative to this meeting.

Finally we have, dealing especially with city problems, the American Civic Association, which aims among other things, "to make living conditions clean and healthful;" and the National Municipal League, which also considers municipal health and sanitation.

The Civic Association has begun an active campaign against that ubiquitous disease carrier, the housefly, and its secretary will have something interesting and instructive to say to us as regards the lines along which this battle is being waged.

This hasty review will show that we have a number of independent regiments in the field all more or less actively engaged in fighting disease, either by destroying the enemy or by cutting off its supplies and allowing it to perish from starvation.

It doubtless will never be possible to unite these regiments into one grand army to be directed by one general. But there is every reason why we should all be on the most friendly terms, and should lend aid to one another. It may be possible, in arranging our respective campaigns, that consultations would prevent unnecessary occupation of the same field at the same time, and that some plan may be evolved whereby all may unite in a general attack under our respective leaders.

I venture to suggest a common meeting ground for consideration of a common enemy, and the line for a general attack. This common enemy is ignorance. We must all depend for success upon an educated public. We are all separately working along this line. Can we not together accomplish far more than singly?

With some diffidence I venture to speak of a way that seems to me to offer the most direct route to the desired end.

I have already intimated that for health reforms we should look more to the child than to the man. Up to this time we have failed to take full advantage of the great opportunity our National systems of education afford for public instruction in health matters. True, our common schools, some of them, are teaching hygiene. This could be immensely more effectively done. I would leave largely to the schools below the high school the teaching of personal hygiene.

What I would especially urge is that colleges and universities, and possibly high schools, should thoroughly instruct each student in all matters that broadly effect the public health.

Can it be gainsaid that most of the health problems we are to consider at this meeting are not of the greatest importance to society as well as to every individual? Should not every young man and young woman, soon to become parents, know the cause and the remedy for preventable blindness, for tuberculosis, and other common preventable diseases? Should they remain in ignorance of the frightful ravages growing out of the social evil? Are not all the problems of municipal sanitation worthy of the most serious consideration by every intelligent citizen? And where are people to secure adequate knowledge of these subjects for their own protection if not in school or college?

The pitiful ignorance of health problems of far reaching concern to State and Nation displayed by members of legislatures and members of congress might excite ridicule if it were not of such serious import. But

they are not to blame. No one ever attempted, at the proper time and place, while in college, to teach them what every legislator, be it municipal, state or national, should know.

When we consider that last year there were in the United States more than a million students in our high schools and nearly one-third as many students in higher education, we can see what an immense opportunity there would be for adequate instruction in health matters if this were taken seriously in hand.

Such instruction, I venture to say, should be given by trained medical men and women who have had special opportunities for the study of health subjects.

It may be noted that we are to consider at this meeting, The Relation of the University to Public Health Work. The Association may deem it wise, after hearing this discussion, to consider ways and means whereby all National organizations interested in public health may unite in presenting to the proper educational authorities the benefits to be derived from a suitable course of studies in public health questions in high schools, colleges and universities

In the consideration of my topic, and in references to other organizations interested in Health, I have had in mind more particularly conditions in the United States, but I assume that in the three other countries associated with us similar organizations have or will be established, and that my observations will be more or less pertinent to all.

I have failed in my purpose if it has not been made clear to those here who perhaps have not considered Health in all its relations, that there is scarcely any great movement of the day into which health does not enter to some degree. Even the question of tariff, if, as many claim, it affects the price of living, has its influence upon the health of the people. The negro question, as has been pointed out to us by one of our members, is intimately related to the spread of hookworm and malarial diseases.

This shows how eminently fitting it is that the cabinet of any Government should have in it a member to represent health interests. The strongest nation, the one of greatest achievements, will in the end be the one that gives the greatest amount of intelligent care to the health of its subjects. Eventually all health interests should be administered by the Government. For the present, these must be largely protected by voluntary, organized effort.

If the first step towards the centralization, or at least the co-operation, of the many associations devoted to health problems can be taken at this meeting, it may be the means of hastening the day when every individual will be given time and opportunity for the pursuit of health and happiness, and the certain knowledge of how and where to find them.

THE INTER-RELATION OF NATIONAL ORGANIZATIONS WORKING IN THE INTEREST OF HEALTH.*

By FREDERIC ALMY,
Buffalo, N. Y.

Both the American Public Health Association and the National Conference of Charities, which I have the honor to represent at this meeting, are in their thirty-eighth year. I represent also the National Association of Societies for Organizing Charity, an infant organization which was born at St. Louis only three months ago, and the main theme of my paper is that we need not only societies for organizing charity, but a society for organizing Charities. We need organization of national organizations to promote co-ordination, co-operation and effective service for common purposes.

Originally a charity organization society conceived its work to be merely the organization of the forces which affect individual families, so that the work of different relief agencies would not overlap, and so that orphan asylums, hospitals, and medical and reformatory influences could be focussed upon the people it was helping. At present such societies also seek, so far as they are able, to organize all the social forces of their community in order to obtain better living conditions for individual families. A modern charity organization society is to some extent a community organization society. Organization does not mean doing things yourself but getting others to do them, and a society of the sort which I represent seeks to become a mother of movements, a social midwife as it were, bringing to birth tuberculosis work, tenement work, fresh air work, playgrounds, pure milk, consumers' leagues, child labor committees, probation, juvenile courts, and the countless modern social agencies. Besides creating agencies where they do not exist a charity organization society seeks to combine for team work those which do exist, and its efforts include not only the charitable forces of the community but its religious, penal, educational and medical forces. Through the churches, the courts and the reformatories it seeks to lift character and lessen vice; through the schools it seeks to lift knowledge and lessen ignorance; and last but by no means least, through the doctors, the health departments,

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 7, 1910.

the tenement laws and playgrounds it seeks to lift health and lessen disease. And if through such community team work modern charity can reduce disease, ignorance and crime it will have hit three body blows at poverty and human misery. It is a holy war; and the conflict is national as well as local.

Already through your organization and its brothers, through our organization and its brothers, through the many blessed organizations of human endeavor, we have made such progress that disease is dying (cholera and small pox are practically dead, and tuberculosis is on the run), crime is being arrested, and poverty is being starved out. Through the electric press on the one hand and bacteriology on the other the contagion of ideas is now more rapid than the contagion of disease; and this will ensure us for the future a progressive amelioration of human conditions.

The National Conference of Charities and Correction was formed thirty-eight years ago to assist this amelioration. Its annual sessions now last more than a week and are attended by over one thousand visiting delegates. The section meetings fill seven large halls, and the embarrassment of choice is distracting. Besides the main conference, other national conferences meet before, after and during its sessions, like the side shows of a mammoth circus. Doctors abound. They outnumber the ministers, or even the lawyers, for medicine has always been a social service profession.

Your president has asked me to describe the national conference of charities; "to point out how the health authorities may have a closer relationship to the charitable organizations in their respective communities;" and lastly, to discuss "the possibility of co-operative work among the various national organizations more or less indirectly concerned in health matters."

Miss Mary E. Richmond, of the charity organization department of the Russell Sage Foundation has said lately, on more than one occasion, that there is now need for team play among national organizations. At the National Conference of Charities last May in St. Louis she read a paper on the inter-relation of social movements, and submitted a pamphlet containing information about 67 national organizations. Fourteen were national health associations, and of these your own association is almost the oldest. Among the youngest health associations are the National Association for the Study and Practice of Tuberculosis (1904); the American Society of Sanitary and Moral Prophylaxis (1905); the Committee of One Hundred on National Health (1907); the Russell Sage Foundation Committee on Prevention of Blindness (1908); the American Association for Study and Prevention of Infant Mortality (1909); and the Rockefeller

Sanitary Commission to eradicate the hookworm disease (1909). In June, 1910, the American Association for Labor Legislation held its first National Conference on Industrial Diseases.

Combination among so many organizations is essential, but of course combination does not mean consolidation, or even central control. Anything like a charity trust or a medical trust, would be apt to discourage new truth and fresh points of view, as well as to check individual enthusiasms. Is there any way to combine so that initiative and originality, or even heterodoxy, will not be curbed, but so that organizations with parallel aims will not pull and haul at cross-purposes, or at isolated times instead of all together. "United an army, divided a mob" is a familiar motto in organized charity.

With national organizations we need chiefly a getting together of those which are similar, but we need also, now and then, the marshalling of those which are dissimilar, where a community problem is to be attacked from different points of view. For anything like the Pittsburg Survey, for example, we need to enlist national organizations of various kinds, and my belief is that this sort of concerted action will increase. Jane Addams writes me that she considers the survey, or social study of a special city or community the most significant and interesting work now being done.

A central national organization, to serve as a sort of clearing house, as a charity organization society often does, is probably neither feasible nor desirable. A central secretary who can keep in touch with the various national organizations and correlate them, is more possible, and may come, though it seems remote. To some extent the National Conference of Charities and its secretary serve the purpose described, for the National Conference is becoming a common assembly, and its secretary keeps in touch with many organizations. My presence here, as his substitute, indicates this, and before I finish I hope to show various ways in which the secretaries of charity organization societies can co-operate with medical associations.

A thing which is possible and so very easy that it only needs the overcoming of inertia, is to have the secretaries of national organizations keep the names of all other such secretaries on their mailing lists, and interchange reports and programs of meetings. Then a secretary would at least know if a national conference were to meet near him or in his city, from which he could obtain a helpful message, or to which he could give one, and each local secretary could notify members who were likely to be especially interested. Executive committees of different associations could get together to map out campaigns. There are conferences enough now, for the whole world seems to be on wheels, but there might even be a

few less if a few of us could more often kill two birds with one stone. For some years the American Civic Association has met regularly with the National Municipal League, though for special reasons they do not do so this year, and the combination appears to lend efficiency to both.

Miss Richmond tried a valuable and apparently a successful experiment last October when she gathered together at a luncheon the secretaries of national social organizations who were in or near New York City. The stenographic report of the discussion which followed the luncheon is most suggestive, and an intention was expressed of meeting again periodically. I was most interested in some remarks of Miss Byington, associate field secretary of the charity organization department of the Russell Sage Foundation. She said that her experience lately in a certain small city had showed her the need of co-operation. She was there to help form a charity organization society, and found that Mr. Hanmer, of the Playground Association, was arranging a meeting also. "As the town couldn't stand two meetings, we had a joint one. I had to follow his illustrated lecture, and suffered in consequence. Each could have done better with the town to himself. When I got back, Mrs. Kelley, of the National Consumer's League, said the place was no good anyhow. If Mr. Hanmer and I had each known the other we could have changed our dates; and, if we had talked with Mrs. Kelley we might have changed our plans more radically."

I am leaving scant time for the other point which I have been asked to speak of,—the way in which health authorities may have a closer relationship to the charitable organizations in their respective communities. The points of contact are numerous, both for health authorities and for medical associations and individual physicians. It is a question whether even the clergy or the schools can so much assist our social work as the doctors. It is estimated that at least 20 or 25% of poverty is due to sickness. Certainly more than that percentage is accompanied by sickness. In the society of which I am secretary, of 2,014 families under care so far this year, 135, or 6½% contain tuberculosis, and 744, or 35% have some other sickness; a total of 879 families out of 2,104, or 41%, in which poverty is accompanied by sickness. If we add to the sick the sickly these figures would be greatly increased.

Such figures as these show amply that disease is a chief cause of poverty, and that the medical battalions must have a leading place in the concerted attack which is at present being made upon the old evils of the world. Professionally, my own concern is with poverty. Sin and vice, though they breed much poverty, may also be a cause of wealth, but this is not so with ignorance and disease, and it is a question which of these two,

ignorance or disease, is most discouraging to a charity worker. Of course, ignorance causes much disease. Disease is usually more innocent than ignorance or vice, and for that reason our sympathy goes out more towards its victims. I look forward to the day when we shall consider public health quite as important to the community as public education, and when there will be free doctors as well as free schools, leaving private doctors like the private schools, for the few who can afford them and prefer them. There are signs of this in the increasing number of doctors already in official service in the health department, in the school department, and elsewhere, as medical school inspectors, tenement, milk and food inspectors, bacteriologists, etc.

Like charity, medicine has made vast strides in the last half century; like charity, also, it is becoming preventive; like charity, the benevolence of doctors in the past consisted mostly of free relief for individuals supposed to be poor, and the abuses of medical charity are familiar. As with charity, the patient, constructive follow-up work of individual cases with social service is comparatively new, and is best illustrated in Boston. As with charity, the best development of modern medicine is the preventive work which attacks the great causes of disease wholesale through pure milk, pure food, pure air and better living. In the notable address which Professor Irving Fisher, of Yale, delivered before the Association of Life Insurance Presidents in February 1909, he said that "It is estimated that at least eight years could be added to human life merely by securing reasonably pure air, water and milk."

For such work as this the doctors need the social workers as much as the social workers need the doctors. I should like to see at every medical conference one or two papers by social workers; just as there are now at every social conference two or three papers by doctors.

The tuberculosis crusade against the great White Plague has been led equally by doctors and by social workers, and there are signs now of a similar wide-spread attack on the great Black Plague of syphilis. The social workers are speaking out courageously on this subject in many public places, and we need your help. The scourges of cholera, small pox, yellow fever, cancer, diphtheria, are being overcome by the doctors with little aid from others; but with typhoid, cholera infantum and the hook worm social workers are helping notably. Occupational or industrial diseases, pure milk, the contaminations of sweat-shop industries, debilitating child labor, play grounds, free baths and housing conditions seem to have concerned the social workers more than the doctors.

Fortunately, medicine, like religion, is laying bare the mysteries which have been considered too sacred to be profaned by the laity, and is simpli-

fying and popularizing its message. The Harvard Medical School, through public free lectures, is explaining to the people in words which they can understand how much they can do to keep well without doctors. There is so much prejudice and ignorance, however, that every possible alliance is needed to advance the gospel of sanitation, pure milk, pure food, pure air and pure water. The work is apt to be resented, misunderstood and decried. As Ruskin says: "Let a child fall into the river before the roughest man's eyes; he will usually do what he can to get it out, even at some risk to himself, and all the town will triumph in the saving of one little life. Let the same man be shown that hundreds of children are dying of fever for want of some sanitary measure which will cost him trouble to urge, and he will make no effort— and probably all the town would resist if he did." It is better to keep a man from catching a fever than to cure him of it. As one of our daily papers has lately said: "For the last ten years sanitation has been coming to the front with greater and greater swiftness and force. Physicians generally and public health authorities in particular are giving more and more attention to it. The press distributes their views and discoveries and the layman now knows better the principles of sanitation than scientists knew them a generation ago."

Our profession is as yet young, and lacks standing. When we speak loudly of the need of open air schools, and medical school inspection, and play grounds, we are not always believed. You can say the same thing with authority. And as you continue in the "community work" which you have added to your case work, you will need more and more the social workers. We can increase the publicity which is so indispensable for social reform; the publicity which destroys social evils as the sunlight destroys the tuberculosis germ. We can help you translate into action the things which we all know but do not do.

We are all saving lives. We are all lifting lives to higher levels. We have perhaps ungenerously usurped the name of social work, but we realize that all professions and all occupations are fast becoming socialized. Religion is at last giving us a social church which thinks more of the miseries of the poor, and how to cure them, than of the dogmas of theology and the history of Palestine. Our libraries and schools are becoming socialized; so are our lawyers, who do much community work. Our business men are beginning to realize that by giving honest products, and honest wages, and by the use of the golden rule with their competitors and with their employees they are ministering to the world more than many ministers. Their work may be best of all, because it is normal rather than altruistic.

When religion, medicine and law, the school, the library and the business man are all inextricably engaged in social work the social workers themselves will have nothing to do except to organize, so far as they can, the work that is going on around them.

I have spoken of the interdependence of our work with yours, and with the work of others also; I have spoken of the need of method, organization and team-play in national movements; but the real topic on which I have spoken here, and on which I like to speak everywhere, is the social use of life.

ON THE PROPER CORRELATION OF PHYSICIANS, ENGINEERS AND OTHER SPECIALISTS, IN PUBLIC HEALTH WORK.*

By WILLIAM T. SEDGWICK,
Professor of Biology at the Massachusetts Institute of Technology, Boston.

The extensive and increasing participation of engineers, chemists, biologists and other specialists with physicians in public health work is a notable and encouraging feature of our time. The public health, that is to say the health of a community of human beings, is the resultant of a multitude of various factors, such as race characteristics, climate, economic conditions, occupation, housing, food and drink, water supply, sewerage, etc., and it is plainly impossible for any one person to have expert knowledge of all. Hence it has come to pass that by the side of the physician—whose services must always be of the first importance in the diagnosis and the treatment of disease, stand the chemist—for the inspection and supervision of the purity of foods and drugs, and for that analytical skill which is required in a host of investigations of all sorts; the biologist—whose skill in bacteriology, parasitology and microscopy makes him already indispensable and whose knowledge of physiology and personal hygiene will eventually make him still more so; the engineer—who must provide safe water supplies, effective sewerage, workable systems of ventilation and many other structural elements of a wholesome environment; the statistician—whose studies of the movements of population, of mortality, of racial distribution and of economic conditions can never be safely neglected; as well as the architect—the physicist—the geologist, and other experts, for aid in special problems as these arise.

But the participation and co-operation of specialists, in order to be most effective and economical, must be correlated, orderly and organized. If it is only irregular and sporadic it may not amount even to co-operation, but may produce conflict and confusion. Examples are not wanting in which such confusion has actually occurred. With an abundance of expert material at hand the time is ripe for us to ask: How can the various specialists now ready to work, or actually working, more or less independently, for the promotion of the public health, be most effectively and economically organized?

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 7, 1910.

Public health forces are of two principal kinds, administrative and scientific. Laws and ordinances for the promotion and protection of the public health must be made, and must be administered by some competent authority. But that authority must have knowledge, and be able to secure evidence, before it can safely act. And the knowledge and evidence required by a sanitary authority must often be expert knowledge, expert evidence. Hence it must be able to employ specialists, to make investigations, and to cause things to be done, all in scientific or technically satisfactory ways. Now it has gradually come about that Boards of Health or Health Commissioners, are the usual constituted sanitary authorities in American communities, so that the problem of the proper correlation of the various forces available for protection and promotion of the public health in such communities, becomes in the last analysis a problem of the proper organization, administration and equipment of our Boards of Health. It will also be admitted, I think, that the final authority, with the ultimate responsibility, must for good administration be well centralized. Doubtless it is for this reason that even when Boards of Health exist composed of three or more members they usually have one chief and responsible executive officer, whether he be called their Health Officer, or Agent, or Commissioner, or Secretary; and when one person rather than a Board becomes the duly constituted sanitary authority he is similarly known as a Health Officer, or a Health Commissioner.

Setting aside as unnecessary for our present discussion the proper composition of a Board of Health, we must next inquire closely into the proper qualifications of the administrative officer or officers charged with the care and oversight of the public health, since upon these officials must rest for the most part that organization or correlation of the expert or specialized forces of the community available for effective public health work. The problem really is—How can the chief sanitary authority of a modern community most effectively enlist and organize for public health work the special knowledge existing within his reach? And in the solution of this problem much, everything almost, will depend upon that authority itself. If it assumes that simply because it is the official head, that head itself embraces all needful knowledge and wisdom, it will soon find itself cut off by itself from all outside aid. But if on the contrary it invites co-operation and counsel; if it submits to specialists special investigations, reserving to itself the final interpretation and application of the results of these inquiries; if it keeps, when it can, an investigating staff of its own, and is guided by their findings and advice; then it may perhaps secure such a correlation of sanitary forces as is obviously desirable.

The first sanitary requirement of any modern community is a good Health Officer. Such a man is not often simply a good sanitary policeman

promoted, nor a mere politician who needs to be provided for. He is a man who knows well the great basic principles of sanitary science and the laws of public health. He may, or he may not, be a physician; he may or he may not be an engineer, or a chemist or a biologist; he may not even be anything but that rarest of combinations, a wise, earnest, honest, able, energetic and tactful executive. But whatever he is or is not, he must at least have a sound working acquaintance with the underlying principles of the protection and promotion of the public health, wedded to a belief in the importance and the validity of the cause he represents. Such a man will give gladly his time and his strength, first, to the general executive and administrative duties of his position, and, second, to a careful and effective correlation with that work of all the special talent which he may be able to command. A squad or a company of specialists, no less than a squad or a company of soldiers or officers must be organized under a commander: and the natural organizer and commander of the sanitary forces of a community is the Board of Health, acting as a General Staff, through their representative, the Health Officer.

But all these things, Boards of Health, Health Officers, and specialists, cost money, and are therefore practicable only for the larger communities. For these the problem is simply—but let no one suppose this is easy—to secure the right Health Officer, and the necessary money. For the smaller communities it is often impossible—and fortunately it is less often necessary—to secure the services of paid specialists. Such communities must therefore look to their chief sanitary officer (if they can afford one, and few communities today can afford to be without one) for much general intelligence and some special knowledge. For the rest they must depend on emergency appropriations or even upon the voluntary aid of citizens' associations and the like. Here again, as a rule, everything will depend on the executive agent of the Board of Health, the Health Commissioner or Health Officer—whatever he may be called. If the community is really too small or too poor to afford such a person, then it must depend upon inexperts, such as the selectmen, or upon volunteer aid, or upon some outside authority such as the State Board of Health. Fortunately, there is no reason today why any community that can pay a young man $1,000 a year or even less should not secure considerable special sanitary training, as well as intelligent, faithful and enthusiastic service. As long ago as 1894, the town of Montclair, N. J. appointed as its executive officer, a young man* who had just graduated from a good technical school with a training in sanitary engineering; and so marked was the advance over previous political appointments, that almost without interruption from that day to this Montclair has had for its Health Officers young men

* Mr. Theodore Horton, now Chief Engineer to the Commissioner of Health, State of New York.

similarly trained, drawn from the same source. And by way of showing that this case is not so rare or exceptional as to make it of no value as an example, I may add that, gradually, other towns near by, perceiving the superiority of the public health work in Montclair, have gone and done likewise, with apparent satisfaction and advantage. Only a few weeks ago the Board of Health of Orange, N. J. on the resignation of its Health Officer) a young biologist who had served them for two years and is now only five years out of his technical school), tendered to him a public dinner—the first ever thus given to an official of Orange—which was attended by the Mayor and others, who spoke with high appreciation of the peculiar value of his services to that city. These examples show clearly that even rather small communities may nowadays, if they will, secure intelligent and efficient health officers at no very great expense.

I enter into these details because they bear directly upon the question at stake. With good Boards of Health, and the right men as Health Officers, there will be little or no difficulty in the proper correlation of the available sanitary forces of either large or small communities. Large communities may well have specialists of all sorts, directly and more or less permanently attached to the staff of the local Board of Health. This arrangement has already been made with excellent results in the case of some State Boards, and ought to be made by all. The same thing is true of some City Boards and ought to be true of many more. Doubtless this plan is also the most economical as well as the most effective, and with the growing burdens of debt and taxation in American cities questions of money supply will soon be no less grave than questions of water supply or milk supply. For small communities, the plan of a permanent staff of specialists coordinated under the Board of Health is not practicable. Here the Health Officer himself becomes all important, not only for his own duties but as the coordinating centre in times of need. If he be a man of tact and wisdom he can often enlist in the public service the sanitary talent of his community, either as temporary paid employees, by special vote of the town authorities, or, if need be, as volunteers; for specialists rightly approached are quite as public spirited as any other citizens. But for all communities, large or small, in order to secure proper correlation there must be organization, and organization always implies some centralization of power and responsibility. Given good organization with some centralization, the problem of proper correlation of available sanitary forces in modern communities is, in my opinion, largely the problem of securing and retaining modest, competent, qualified, and judicious Health Officers. Whether these shall be physicians, engineers, chemists, biologists, or any other particular form of specialist is a question of minor importance.

Section of Municipal Health Officers

THE VALUE OF TERMINAL DISINFECTION.*

By DR. CHARLES V. CHAPIN,
Superintendent of Health, Providence, R. I.

Terminal disinfection is a matter the importance of which is perhaps best emphasized by its cost. The following shows the expense of disinfection for five eastern cities for the year 1908

Boston,	$20,123.49
New York,	55,369.41
Philadelphia,	24,115.75
Baltimore,	6,603.78
Washington,	5,786.00

The value of such an expenditure ought to be carefully considered, and, as has been urged by Rickards before this Association, we ought again to study the efficiency of the methods and the necessity for the procedure.

Several considerations have led to a questioning of the importance of terminal disinfection. The first in point of time was the fact that the introduction of the procedure, and an increasing rigor in its application, and increased efficiency in methods, was not followed by a decrease in the prevalence of scarlet fever and diphtheria, the diseases for which it was chiefly employed. Thus in Providence after we had developed and applied methods of disinfection by steam, formaldehyde and corrosive sublimate, we had the most extensive outbreak of diphtheria which had occurred in fifteen years. Such an experience is far from unique and other failures of disinfection will later be noted.

We are coming to see that the contagious diseases are not as contagious as was formerly believed. It often happens that a case remains for weeks in a family without infecting others. In the average family with scarlet fever, the chance of children, even at the most susceptible age, contracting the disease, is only one in three; for the adult males it is only one in fifty. The danger from infected things is manifestly far less than the danger from infected persons. In the latter the germs are continuously developing

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 1910.

in enormous numbers, while on the former they are rapidly dying. There is no need of emphasizing to this audience the fact that the pathogens do not grow outside of the body.

A study of the extension of scarlet fever and diphtheria from one family to another in the same house indicates that fomites are of very much less importance in the transmission of disease than was formerly thought. A large series of observations in Providence show that such an extension occurs in only about six or seven per cent. of the exposed families. Most of this secondary infection occurs before the disease is recognized, or among families known to have visited the infected household. If there is no communication between the families there is practically no extension of the disease. Yet in most tenement houses the well members of the infected family, many of whom in diphtheria at least, are known to be carrying virulent bacilli, are using the same doors, hallways, stair-rails, cellars, water closets, etc. All these parts of the house ought, according to current views, to be effective bearers of disease germs, yet they are shown to be in no wise dangerous. Many articles which ought theoretically to be most potent sources of infection, as money, rags, and second hand clothing, have been shown to be practically innocuous.

The theory of infection by fomites never had any but the flimsiest basis in observation or experiment. It is true that instances are reported of possible infection by fomites in scarlet fever, diphtheria and measles, but though in the aggregate they are considerable in number, they are alleged for only an infinitesimal portion of the reported cases. No one has ever seriously attempted to estimate what proportion of cases are traceable to fomites. In the alleged instances of fomites infection there is almost never any real evidence that the disease is caused in the manner stated. There is usually only a possibility, rarely even a probability, and a demonstration would be almost unique. In the supposed transmission of disease by fomites, persons also are usually involved, either as the bearers of the things or otherwise, and persons are far more likely to be the bearers of the germs than are the things. Which is the more likely to cause the recurrence of diphtheria in a house, bacilli dying upon the walls and furniture, or propagating in throat and nose of convalescent or carrier?

The theory of infection by fomites, like the theory of infection by air, was a purely an *a priori* theory. To determine the sources of cases of contagious disease is usually impossible. There is not generally any direct and obvious connection with previous cases. Hence from remote antiquity fomites have been believed to be one of the chief factors in the extension of disease. Whatever its origin, the theory of infection by fomites has been maintained because it afforded the only explanation of the

phenomena of disease extension. If other and better explanations are at hand this theory may be questioned, and it should be abandoned unless its advocates can substantiate it by observation and experiment. The burden of proof rests on those who would maintain the theory, not on us who question it.

It is now no longer necessary to assume the agency of fomites in the transmission of these diseases. Contact infection is the most obvious mode of extension, and though we know that contact between the well and the really sick does not usually take place, we do know that there is ample opportunity for the most direct contact between the general public and convalescent or other healthy carriers of disease germs. These unknown sources of infection are so numerous that most recognized cases may well be due to direct contact with them. We no longer have any difficulty in explaining the source of contagious diseases, the wonder rather is that there are not more cases. If infection by fomites were as effective as is supposed, there would be far more contagious disease than there is. The number of unrecognized human foci affords no room for infection by fomites.

The foregoing considerations, and others to be mentioned, had already led the writer to question very seriously the agency of fomites in the spread of disease, when the wonderful work of the American Yellow Fever Commission showed beyond question that yellow fever is never carried by fomites. I had always believed that if any disease was fomites-borne it was yellow fever. The evidence of its transmission by clothing, bedding and merchandise was stronger than for any other disease. Yet all this evidence was shown to be worthless. Was it not time to ask how often scarlet fever is carried in clothing, or how often diphtheria germs linger on the walls of a room?

The earlier findings of bacteriology seemed to support the theory of infection by fomites. It was learned that many bacteria, even those of the non-spore-forming kinds, have at times considerable powers of resistance. Bacilli of tuberculosis, of diphtheria, of typhoid fever and others, were shown to survive, under some conditions, for many months. It was even thought that they might under favorable circumstances propagate outside of the body. It is even now no rare thing to hear health officers in good standing mislead the public by making statements that damp and ill-lighted houses are favorable for the growth of the tubercle bacillus. But we now know that the common disease-producing bacteria are not saprophytes. We know that instead of growing outside of the body they begin to lose their virulence and die almost as soon as cast off. The tendency of

recent work is to show that pathogens are not so resistant as was formerly thought.

But the most important point is that most of the studies on the resistance of bacteria have not been quantitative, and many have failed to recognize that the virulence of germs often disappears before their death. We should realize that while a few germs may survive perhaps for weeks, most of them die in a few days. Houston showed that while some typhoid bacilli could be recovered from London tap water up to eight weeks, 99.9 per cent. perished in one week. The survival of such a small percentage of pathogenic bacteria in water appears to be little dangerous; in the air it would probably be still less dangerous. Hill has suggested, and probably correctly, that the reason why tubercle bacilli, which are less resistant than diphtheria bacilli, are more often recovered from fomites than are the latter, is simply because the tubercle bacilli are discharged in such very much greater numbers that more of them have a chance of survival. The life of some pathogens, as the germs of pneumonia, influenza, gonorrhea and cerebro-spinal meningitis is so restricted, that fomites can certainly be of no moment in the extension of these diseases.

Of rather more interest, though by no means conclusive, is the field work of the bacteriologist. The researches of Cornet and a host of followers have shown that tubercle bacilli are quite commonly found in considerable numbers in the apartments of careless consumptives. Search for diphtheria bacilli has not, for the reason given above, been nearly so successful. Out of towards 1400 swabbings taken from supposedly infected rooms by Schumberg, Weichardt, Hill, Gorham and Kober, diphtheria bacilli were found only about a dozen times, and only on such objects as handkerchiefs, toys and drinking glasses.

After all, however, bacteriological evidence cannot be conclusive. Although virulent bacteria may be found to some extent on objects supposed to act as fomites, they may not be an appreciable source of danger. Pus forming bacteria are found in the air of operating rooms, but the surgeons no longer sterilize the air, as was at first supposed by Lister to be necessary. The epidemiological arguments previously considered, have seemed to quite a number, sufficient reason for seriously questioning the importance of fomites infection and the value of the usual routine terminal disinfection. To the writer there seemed little warrant for disinfecting after deaths from tuberculosis, which is supposed to be by most health officers and secretaries of anti-tuberculosis leagues, such an important prophylactic measure. If, as the phthisiologists tell us there is no danger in living with a careful consumptive, there can be no danger in living in his house after he is dead. Or, if a consumptive has been careless all

through his sickness his family will gain no security by the rite of disinfection after his demise. If a careless consumptive dies or removes, it is, according to our present knowledge, desirable that his apartments should be cleaned, or disinfected if you will, before they are occupied by others, but to disinfect after every death as has been urged, has only resulted in focusing popular attention upon a very unimportant source of the disease.

But it is after diphtheria that the present practice of terminal disinfection seemed most unwarranted. There certainly can be no use in trying to destroy the few dangerous bacilli which theoretically may remain in the apartment occupied by a diphtheria patient, unless we can be reasonably sure that he and the other members of his family are not growing the bacilli on their mucous surfaces. This certainly we cannot be sure of unless at least two successive negative cultures are obtained from throat and nose. Indeed, owing to the limitations of this bacteriological test, it is highly probable that even after two negative cultures, the chance of the bacilli still persisting in throat or nose is much greater than it is that they persist on the walls and furniture. As such an onerous requirement as cultures from the whole family before release from isolation, is impracticable, it was decided in Providence to abandon terminal disinfection, except under the conditions named, and this was done in March, 1905. An additional reason for this step was that the ordinary methods of disinfection are not reliable, and as suggested by Rickards, we ought either to give up disinfection, or to really disinfect. In Providence we chose the former. No unfortunate effect seems to have been produced on the prevalence of diphtheria. After the practice was abandoned in March the cases began to fall off until at one time in August there was not a reported case in the city. Again in August, 1908, the disease was reduced to a single case. It is true that we have had an extensive outbreak since disinfection was abandoned, but it was scarcely half as severe as one in Worcester at almost the same time, and though we have had more diphtheria during the last few years than some cities, it has been substantially the same as in the nearby city of Boston.

The amount of recurrence of the disease in the family is generally believed to be a measure of the value and success of disinfection, though it seems to me probable that practically all such recurrences are due to infection from carriers in the family. This is strongly suggested by the fact that recurrences after the return of patients from the hospital are about as frequent as they are after the removal of the warning sign in home-treated cases. For the benefit of those who lay stress on the importance of recurrences, the following figures from the experience of Providence are given:

Providence.

The number of recurrences after disinfection, the number of infected families and the rate of recurrence during the years 1902 and 1905 was as follows:

Diphtheria, 1902-5.

Year	Infected Families	Recurrences	Rate
1902	358	6	1.67
1903	453	7	1.54
1904	559	10	1.78
1905	87	2	2.30
Total	1457	25	1.71

The number of recurrences since February, 1905, where there was no disinfection, and the ratio to infected families where there was no disinfection is as follows:

Diphtheria, 1905-9.

Year	Infected Families	Recurrences	Rate
1905	258	4	1.55
1906	259	4	1.55
1907	343	7	2.04
1908	687	17	2.34
1909	472	10	2.12
Total	2019	42	2.08

There is certainly nothing in these figures to suggest danger from abandoning disinfection. The difference in favor of disinfection is not greater than the margin of error. It is interesting in this connection to compare the recurrences in Providence where there is no disinfection with the recurrences in Baltimore where disinfection is done and carefully checked by test cultures.

Recurrences after Diphtheria.

Ratio of recurrences within 60 days, in house, to number of reported cases.

BALTIMORE.

Year	Cases	Recurrences	Per Cent.
1903	1096	20	1.82
1904	1241	18	1.45
1905	962	17	1.77
1906	1172	22	1.87
1907	867	21	2.42
1908	837	10	1.19
1909	756	14	1.85
Total	6931	122	1.76

PROVIDENCE.

Disinfection.

Year	Cases	Recurrences	Per Cent.
1902	530	8	1.51
1903	706	7	0.99
1904	780	19	2.44
1905	140	2	1.43
Total	2156	36	1.67

No Disinfection.

Year	Cases	Recurrences	Per Cent.
1905	422	5	1.18
1906	407	6	1.47
1907	570	7	1.23
1908	917	17	1.85
1909	639	3	0.47
Total	2955	38	1.28

In order to make the Providence figures comparable to those of Baltimore, it was necessary to include recurrences in other families in the house as well as in the family first invaded, and to calculate the percentage on total cases, rather than on invaded households. As for the invasion of other families in the house after removal of the warning sign from the first family, it was in Providence, when there was disinfection 1.2 per cent. of 851 families, and when there was no disinfection 0.4 per cent. of 1679 families.

Another possible method of testing the value of disinfection is to note how often well persons removing from the infected family during the course of the disease are taken sick on their return. In Providence since disinfection was abandoned, of 585 persons, of whom 510 were under 21 years of age, who thus went away from home, only 1 was taken sick after return, or 0.18 per cent. Previous to the abandonment of disinfection there were 9 attacks among 1055 persons, or 0.85 per cent.

There is nothing in these experiences to indicate that there is any appreciable value in the practice of routine terminal disinfection after diphtheria. So evident is this, and so similar from an epidemiological standpoint, are scarlet fever and diphtheria, that we have been gradually abandoning disinfection after the former disease also. The following shows the recurrences where there was and where there was not official disinfection:

PROVIDENCE.

The number of recurrences after disinfection for scarlet fever, the number of infected families, and the rate of recurrence during the years 1904 to 1908, was as follows:

SCARLET FEVER, 1904–9.

Year	Infected Families	Recurrences	Rate
1904	868	12	1.38
1905	298	2	.67
1906	398	9	2.26
1907	540	8	1.48
1908	273	3	1.09
1909	52	3	5.77
Total	2429	37	1.52

During the last two years the recurrences where there was no disinfection were as follows:

SCARLET FEVER, 1908-9.

Year	Infected Families	Recurrences	Rate
1908	40	1	2.50
1909	377	10	2.65
Total	417	11	2.64

The next table shows the number of recurrences in Baltimore and Providence, comparable data being employed as in the table for diphtheria:

RECURRENCES AFTER SCARLET FEVER.

Ratio of recurrences, within 60 days, in house, to number of reported cases.

BALTIMORE.

Year	Cases	Recurrences	Per Cent.
1903	1224	10	0.89
1904	1222	21	1.72
1905	615	12	1.95
1906	577	7	1.21
1907	436	11	2.52
1908	1262	17	1.34
1909	456	6	1.31
Total	5792	84	1.44

PROVIDENCE.

Disinfection.

Year	Cases	Recurrences	Per Cent.
1904	1220	23	1.88
1905	454	6	1.32
1906	615	12	1.95
1907	809	10	1.24
1908	389	3	.77
1909	75	3	4.00
Total	3562	57	1.60

No Disinfection.

Total	Cases	Recurrences	Per Cent.
1908	52	1	1.92
1909	552	16	2.90
Total	604	17	2.81

Both theory and the facts, so far as any data are available, indicate that terminal disinfection, after diphtheria and scarlet fever is of no appreciable value. Much of the disinfection after tuberculosis also is useless. The feebleness of the germs of influenza, cerebro-spinal-meningitis and pneumonia, indicate that fomites can have no part in the extension of these diseases, and that disinfection is unnecessary. In all diseases

in which the carriers and missed cases are very numerous, or in which the patient is infectious and about, during the prodomal stage, terminal disinfection can accomplish nothing and for *this* reason alone it is useless after the diseases just named, and also after measles and whooping cough. Disinfection after measles, which was practiced in Aberdeen for twenty years, had no influence on the prevalence of the disease, neither did the adoption of this practice in New York, and its omission for a time in 1908 was without effect. There is no evidence that disinfection after cerebrospinal meningitis in New York had any influence in checking the disease.

These views in regard to disinfection are not local merely, but have been developing independently in the minds of many. Several leading French physicians have stated that compulsory disinfection has not lessened contagious diseases in Paris. Comby is emphatic in his contention that it is persons, not things, which are the bearers of infection. Lemoine has shown that the disinfection of hospital rooms is not necessary to prevent the development of contagious diseases. In England Richards says terminal disinfection after diphtheria is of very little importance, and Barlow, Butler, Hogarth and other health officers have ceased to regard disinfection as essential. The disinfection of school rooms, periodically, as well as after the occurrence of contagious disease, has been urged by many besides the makers of disinfectants, especially in England, but most of the health officers have refused to be lead by the clamor, and Kerr, the chief medical officer of schools in London, has clearly set forth the reasons why the room can rarely be at fault in school outbreaks of the contagious diseases.

While there is no evidence that fomites, as the term is generally understood, have an appreciable part in the spread of contagious diseases, there can be little doubt that much of what is properly called contact infection is mediate, and is due to the transfer of fresh infective material on inanimate objects. This mode of infection is to be combatted by employing as scrupulous cleanliness as possible in the care of the patient. Plenty of soap and water daily on the things directly in contact with the patient, and on the hands of the nurse will do much to prevent the spread of disease in the family. Terminal disinfection does nothing, and in a large degree withdraws attention from the importance of contact infection and the necessity for personal cleanliness. It is chiefly for this reason that the routine practice of terminal disinfection is objectionable. It is not a harmless custom, but it is a powerful factor in focusing attention upon unimportant modes of infection. Moreover it costs money. In Baltimore, for instance, the expense is $6,000 per annum. A good visiting nurse can be obtained for $1,000 and six such nurses could accomplish a

world of good in assisting in the care of the sick, and instructing by precept and example, in methods of cleanliness in the management of contagious diseases.

It is not claimed that thorough terminal disinfection is never necessary. When a new or comparatively rare disease invades a locality, it may at times be desirable to take extraordinary precautions to prevent its extention, precautions which would be entirely useless if the disease were established. If a case of smallpox should occur in a city, which has been free from it for years, it would be worth while perhaps, to expend considerable time and money in disinfection, even though the chance of infection from she room or goods might not be one in a thousand. But if there were hundreds of cases of measles in the city, it would be folly to go to the same trouble and expense for each case, even if the chance of infection were ten times as great. A spark in the dry grass should be stamped out at any cost, but it is useless to waste time in extinguishing the smoldering flames left here and there as the line of fire is sweeping across the prairie.

Section on Vital Statistics

THE IMPORTANCE OF BIRTH REGISTRATION TO DETERMINE INFANT MORTALITY.*

By J. H. MASON KNOX, Jr.,
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In the presence of a company of experts better informed than any others in this country on all questions pertaining to our vital statistics, it is not my purpose to discuss in any detail the mechanism of birth registration or to enter a plea for any particular method to secure the complete recording of every birth. It is rather as a practitioner of medicine who has been devoted for several years to the study of the diseases of infancy and childhood that I presume to present before this body some of the advantages which would accrue to the physician interested not only in the cure of illness, but especially in the prevention of disease and death among infants, from an accurate knowledge of the birth of every citizen. The time has long since passed in this and in all civilized countries when the experience of any one consulting room or hospital or even that of a whole community is of as much value as is the information obtained through official channels in the form of general vital statistics. Through them often can the biased judgment of a single observer or group of observers as to the incidence of disease and the cause of death be corrected, and their limited horizon broadened. No one engaged in the active practice of medicine in any community can afford to be without interest in the vital statistics of that community. Their proper interpretation will be of almost as much service to him as his knowledge of physiological function and of the action of drugs. The doctor indeed everywhere should be the best informed champion of the need of accurate statistical data concerning the birth, health, and death-rate pertaining in all sections of the country. General interest in the fact of the tremendous death-rate among infants is just beginning to be aroused. To members of this section doubtless it is an old story, but to the country at large and to the majority of practitioners the extent of the yearly toll paid by the baby has not elicited the horror that it should.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 1910.

When we consider that probably 300,000 infants under twelve months of age die each year in the United States, nearly double the total number of deaths from tuberculosis, the claim of the baby upon the best services of the statistician, obstetrician, pediatrist, general practitioner, and the public generally, becomes at once self-evident. More than this a large majority of these infant deaths occur within the first few weeks of life, so that assistance, if it is to be of much avail, must be rendered promptly. It is generally agreed that fully one-half of these infant deaths could be prevented by adequate measures of relief.

In proof of this are two incontrovertible facts: First—The death-rate among exclusively breast-fed babies is comparatively small. Second—The death-rate among artificially fed babies, properly cared for and given the best artificial diet, is likewise small. Ignorance, on the part of the mother, is perhaps the greatest single factor in this annual slaughter of the innocents. "And how shall they hear without a preacher?" "And how shall they preach except they be sent?" And how can physician, visiting nurse, or health officer, be sent into the home of the overworked and ignorant mother to help her care for the baby unless its arrival is known? This information cannot be secured without birth registration. When we consider that a large proportion of our population are living under hygienic conditions very far from ideal, and that the struggle for daily bread is becoming more and more intense, certainly the duty of those having knowledge and authority becomes the more urgent to mitigate as far as possible in the most practical way the unnatural dangers to life and health, to which so many of our fellow citizens are subjected.

The first step in this assistance is to have certain knowledge of the condition. It goes without saying that every mother giving birth to a child in the city slums would be better off for advice and probably for assistance in the care of her child. For many of these unfortunate infants the nation, the state, or the city should stand in "loco parentis." The public is responsible in acquiescence at least for the wretched conditions surrounding the birth and rearing of these future citizens, and is in duty bound to see that they receive in their helpless dependency such diet and surroundings as will give them at least a chance for life and health. This assistance cannot be rendered in any adequate measure unless the knowledge of the baby's existence is promptly recorded. Experiments tried upon a small scale in several of our large cities have brilliantly demonstrated how much can be done for the average baby when instruction to the mother and nursing care were furnished immediately after the baby's birth.

Thus in New York in the obstetrical-pediatrical out-service of Drs. Hill and Swarz, during one year, 784 babies were delivered in a crowded section of New York. Instruction to the mothers in their homes was given in each case by physicians and nurses, and where necessary pure milk was furnished. During this period but thirty-eight infants died, a mortality of less than five per cent.

At our milk stations in Baltimore, although most of the babies come under our care already ill, the death-rate is about one-half of the general death-rate of the same age.

Prompt registration of births would be of assistance in bringing help to a large number of innocent babies now criminally neglected. I refer to those who have no acknowledged father, who are born out of wedlock. There are in nearly all parts of the country stringent laws forbidding operative interference during pregnancy. At this early period the life of the child is most carefully guarded, its ruthless destruction is murder and punishable by death; yet everywhere it is permissible for a mother to hand her newly-born child over to ignorant caretakers or crowded institutions where its life in a few weeks is just as surely and as ruthlessly destroyed, without any legal interference and with the most amazing acquiescence on the part of the public. If every such birth were duly registered and the moral obligation recognized, of keeping the mother and child together for the good of both, and in surroundings at least compatible with healthful infant life, many of these legalized murders would be prevented.

The largest group of maladies responsible for the death of infants is made up of serious disorders of the gastro-intestinal tract. Every child born has an indubitable right to its natural nourishment, its digestive system is intended for no other diet. When by force of circumstances this is denied it, the least which a civilized and philanthropic public can offer the helpless infant is the best possible substitute. That this is not true at present in the case of the large majority of infants born in this country we are all painfully aware, and we also know that the substitutes for mother's milk, ill advised both in quantity and quality, for the needs of the infant are directly responsible for the incidence of these intestinal disorders and for the subsequently large death rate.

Each summer I have the painful duty of attempting to treat scores of babies suffering from gastro-intestinal disease which in large part could be prevented had adequate instruction and diet been furnished the baby from the beginning. The highest death-rate in this class of cases occurs in the earliest infancy. It is during the first few weeks that any artificial food is particularly precarious, and only the best moderately satisfactory.

If there were prompt notification of every birth in a community to the proper authorities and simple instruction, adequate diet and nursing were provided where needed, a large proportion of these digestive disturbances would be averted. The treatment of these ailments is often unsatisfactory, the physician has to stand by and see the little lives flicker out, when he knows that timely assistance would have rendered his services unnecessary.

In another group of cases notification of birth would be particularly efficacious; namely, in the case of children of tuberculous parents or in a tuberculous home. We are learning that the incidence of tuberculosis during the early months of life is much more common than we supposed. We know too that the disease is rarely if ever inherited, and that it will not appear in the offspring of tuberculous parents if the child is removed from its infected environment. That tuberculosis in all parts of the country should be a notifiable disease admits of no argument. This being true it is the height of folly and culpable negligence if the authorities are not notified of the birth of the baby, the most susceptible of all classes of the community to tuberculosis in a tuberculous home.

The same argument applies to children born of syphilitic parents. It is to be earnestly hoped that the time is not far distant when venereal diseases will be reported in this country as they are abroad, and more efficient and radical steps taken to protect the innocent from their ravages. Congenital syphilis is at best a most malignant disorder, and in most cases baffles all medical aid. The only hopeful outlook for the baby is in thorough treatment begun at birth. Far more efficacious, of course, would be the restraint from marriage of persons so diseased

Another ailment not usually fatal but often resulting in a condition almost worse than death is ophthalmia neonatorum which supplies from twenty to forty per cent of the blind in the country. As is well known this affliction in the newly born yields to treatment if this is instituted promptly after birth. It is hard to see how this can be carried out unless the authorities having the health of the community in their care are notified at once of the birth of every baby.

There are other conditions associated with a high infant death-rate which could be in part averted through birth registration. Among these should be mentioned the overlying of infants, apparently particularly common in London, and many cases of prematurity which without prompt and efficient nursing care quickly succumb.

But apart from all these reasons from the standpoint of the baby which would seem to demonstrate clearly how important to its welfare is the official recognition of its birth, there is much else that could be said from other points of view. It certainly does not comport with the dignity,

intelligence, and might of our nation to have it practically the only civilized country in the world which in much of its extent takes less account of the increase of its citizenship than it does of the birth of blooded stock and poultry.

If birth registration is important in the older countries where the conditions of life are comparatively settled, how much more useful would it be in this new and vigorous commonwealth made up of so many different races and containing within its boarders such a variety of climatic and industrial conditions! Is it not of the first importance for the United States to have on record the birth-rate prevalent in all sections of the country, in the larger cities, among miners, among factory workers, and among dwellers in the mountains as compared to those on the plains? This information would be invaluable not only for the statistician, physician and statesman, but also for the prospective settler. If the injunction to "know thyself" is fundamental to the best efficiency of the individual, is it not equally true of the nation, and where could this knowledge better begin than in the proper recording of the birth of its citizens?

I have no brief for any particular form of registration. Three features, however, seem to me to be most desirable. First—That the law governing birth registration should be uniform. The multiplicity of enactions now on the subject in the various states unquestionably tends to defeat the very object for which they were drawn. Second—Birth registration* should be prompt, certainly within thirty-six hours after the birth. In this way only can effective measures be taken to prevent opthalmic neonatorum, early infection with tuberculosis and other ills so dangerous to the newly born.

Third—Birth registration should be simple. The common excuse of the physician is that it takes too much time to return the complete record. The simple return of a postal card stating the fact of a birth may be the best method of securing general co-operation. Further details necessary could be obtained at a later date.

Whether the primary responsibility should rest upon physician, midwife, or parent, I do not feel myself competent to judge

Certainly much has been done in many cities, as for example, in Washington, St. Louis, by the sensible and forceful measures adopted by their health officers. Many of us, however, are impatient at the irregular and interrupted progress in a matter of such fundamental importance. We believe in the enactment of the simplest plan of effective birth registration, and in the rigid enforcement of such a law.

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*Better results from the standpoint of both physician and statistican could be obtained if a distinction were drawn between notification of the fact of birth with the address, within a few hours, and the registration of the birth giving name of child and more detailed information as to parents, etc. This need not be returned for several days. Both notification and registration are necessary and each aids the other.—J. H. M. K., Jr.

Laboratory Section

CHAIRMAN'S ADDRESS.

THE PAST PERFORMANCES OF THE LABORATORY SECTION WITH SOME SUGGESTIONS FOR THE FUTURE.*

By WILLIAM ROYAL STOKES,
Baltimore, Md.

The Laboratory Section of the American Public Health Association was established in 1899, and since that time the Section has accomplished a number of important pieces of work, and its members have contributed much towards the advance of sanitary science. One of the most important functions which it has served has been the opportunity given to its members to meet and discuss questions of laboratory hygiene, both by means of papers, discussions and informal gatherings, and during the lifetime of the Section, its members have seen many investigations develop in matters of practical sanitary application.

It would be impossible to make special comment upon the individual work performed by the various members of our association, but it is only necessary to mention such subjects as the Bacteriological Investigation of Drinking Water, The Microscopic and Bacteriologic Examination of Milk, The Critical Studies of the Various Methods for the Chemical Examination of Milk and Water, The Investigation of Various Food Preservatives, The Study of Filtration Plants, and The Algal Pollution of Drinking Water, The Studies of Various Constituents of Culture Media in Relation to the Increase and Other Biological Properties of Organisms, The Investigations Concerning the Most Approved Methods of Technique in the Bacteriological Diagnosis of Infectious Diseases, the Detection of the Typhoid Bacillus in Water, Investigations Concerning Rabies, the Chemical Disinfection of Water and Sewage, The Investigation Concerning Tuberculosis in Human Beings and Animals, The Bacteriological Examination of Shell-Fish, The Experiments on Various Methóds of Disinfection, and many other equally important subjects too numerous

* Read at 38th Annual Meeting of the Laboratory Section of the American Public Health Association, Milwaukee, Sept. 1910.

to mention to see the practical results which have been the outcome of these investigations.

The most important piece of concerted work accomplished by the Section has been the Report of the Committee on Standard Methods of Water Analysis, and it is perfectly obvious that this report has placed the subject upon a firm foundation where bacteriologists can work upon a common basis.

After receiving this report, the Section appointed from time to time Committees on Standard Methods for the Chemical and Bacteriological Analysis of Water, Sewage, and Milk, as well as Committees on Standard Methods for the Bacterial Diagnosis of Diphtheria, Tuberculosis, Typhoid Fever, Glanders, the Microscopic Examination of Rabies and Syphilis, Standard Methods for the Preparation of Antitoxin, Vaccine, Tuberculin, and Mallein, the Standardization of Methods for the Examination of Shell-Fish, and for Testing Disinfectants, and on the Best Methods of Mailing Infectious Material in a Legal Manner.

The Section has now fifteen of these Committees at work, and the Committee on Standard Methods for the Bacterial Examination of Milk, and the Committee on the Standard Methods for the Examination of Air, have already made admirable and complete reports covering these subjects up to date. The Chairmen of these Committees have been continued in order to add modifications which they may deem important in the future. Other Committees investigating such subjects as diphtheria, glanders, tuberculosis, rabies, typhoid fever, bacterial examination of water and sewage, and chemical analysis of water and sewage, have made good reports of progress, and the programme for this meeting promises reports from the Committees on disinfectants, rabies, syphilis, diphtheria, examination of shell-fish, and mailing infectious material.

In connection with this subject I wish to emphasize an idea which as far as I know originated with Dr. Wesbrook. It is that these reports should be arranged as a series of volumes to be issued by the Association for the guidance of laboratory workers. Such publications would certainly serve the same purpose which has already been accomplished by the report on the Standard Methods of Water Analysis, and I am sure that bacteriologists throughout the country would welcome them with enthusiastic pecuniary support. Their sales might also add something to the revenue of the Association, and might even turn our faithful secretary and managing editor, Mr. Rickards, into a frenzied financier in handling the returns from their sale.

I also believe that we can strengthen our Section and the Association by a continuation of the campaign waged by Mr. Rickards, as the chair-

man of the Membership Committee of the Laboratory Section. A subcommittee from our own Section might act under the direction of the Association chairman, and this campaign should be continued throughout the entire year, This might be modeled somewhat after the method pursued by the American Association for the Advancement of Science, which sends out personal appeals from the various Sections signed by several of their prominent members, thus greatly increasing their membership. An excellent opportunity will be offered at the meeting of the International Congress on Hygiene and Demography in 1912 to reach many laboratory men, and a small sum might be granted the secretary to use in circulars, and other proper forms of advertising for members.

The Association has also made a good impression by means of its exhibition, and the Laboratory Section could be of great service in this regard by collecting exhibits representing the various laboratory methods and utensils employed in the hygiene laboratory. Specimens of mailing outfits would also be very instructive, as each laboratory has something to bring forward which may be instructive in the general work.

I would suggest that the Laboratory Section establish the custom of meeting in joint session with the Section of Municipal Health Officers and the Section of Vital Statistics, as such conferences are valuable in affording the opportunity for an interchange of views of laboratory workers with the men who are more directly concerned with the practical details of preventive medicine.

In concluding my remarks, I wish to briefly refer to the influences which a few of our members have exerted and who are since deceased, and I shall first refer to the work of Dr. Wyatt Johnston. In the introductory remarks made by Dr. Welch at the first meeting of the Laboratory Section in speaking of "The Relation of the Laboratory to Public Health," he made the following statement: "Many of you know that the workers in these laboratories have come together on this occasion in unusual numbers largely through the work of our public spirited member, Dr. Wyatt Johnston. These workers have been brought together here with the view to organizing a Laboratory Committee or Section of this Association," and I think that due credit should be given to Dr. Johnston for having organized the Laboratory Section.

On page 37 of the 26th volume of the Transactions of the American Public Health Association, under the caption of the Etiology of Yellow Fever, by Walter Reed, James Carroll, and Jesse W. Lazear, we find a brief note at the bottom of the page which refers to the death of Lazear. In small type it makes the following statement: "Died of yellow fever

at Columbia Barracks, Cuba, September 25, 1900." The conclusion of the article is as follows: "The mosquito serves as the intermediary host for the parasite of yellow fever."

It is unnecessary for me to remind this Section of the wonderful practical application of this discovery in Cuba, Panama, and New Orleans, and we should be proud that two of these men were members of our Section.

I also wish to refer to the influence which the late Professor Robinson exerted in our Section. Hardly a step in the way of advancement was ever taken without seeking his counsel and advice, and he also contributed largely to the success of the Section by valuable investigations and papers.

After all, if the rest of us can follow the example which these men set, we need never fear for the future and enduring success of our Laboratory Section. In thanking this body for the great honor which it has conferred upon me, I can only express the belief and wish that it may be said of you as can be rightly said of Johnston, Reed, Carroll, and Robinson, "And he stood between the dead and the living, and the plague was stayed."

THE EFFECT OF VACUUM DESSICATION UPON THE VIRUS OF RABIES WITH REMARKS UPON A NEW METHOD.*†

By D. L. HARRIS, City Bacteriologist and Pathologist of the City Hospital, St. Louis, and L. F. SHACKELL, Assistant in Physiology, St. Louis University.

Shackell has described an improved method of vacuum dessication, the essential feature of which is that the material is kept solidly frozen during the process of drying. Animal tissues when dried by this method are preserved intact, show no shrinkage, are porous and resist chemical changes and deterioration. In brief, the technique is as follows:

The material to be dried is placed in the bottom of a Scheibler's vacuum dessicating jar, in the upper part of which is a separate dish containing H_2SO_4; the temperature is reduced by placing the jar, half submerged, in a salt and ice mixture, and after thorough solidification of the material has resulted, a rapid vacuum is produced by a Geryk pump to less than 2 mm. of mercury. During the process of dessication, the temperature in the lower half should be kept several degrees below 0° C. Unless the H_2SO_4 be repeatedly shaken to prevent surface saturation with water, the time required for complete dessication will be unduly prolonged.

Pasteur attenuated the virulence of rabic material by drying in the presence of air over caustic potash. The time required for complete loss of virulence by this method depends upon the surrounding temperature. At 23°C this point is reached in from six to eight days. Vansteenberghe found that virulence may be maintained for several months if the brains be ground into a pulp, spread out in a *very thin layer* and dessicated in vacuo *very rapidly.* Marie repeated this experiment with partial success.

We have found that by using Shackell's method of dessication, brains and cords may be dessicated *in toto* without destruction of virulence. The time required for the complete extraction of water is about 24 to 36 hours. A number of brains have been so treated and the infectivity of all has been preserved. After the completion of dessication, these brains were placed in an ordinary dessicating jar over H_2SO_4 and left continually exposed to light at the ordinary room temperature. One brain has remained infective for four months. The only precaution taken was to guard against moisture. Material thus dried is like chalk and is easily

* Read before the Laboratory Section of the American Public Health Association at Milwaukee, September, 1910.
† From the Pathological Laboratory of the City Hospital and the Physiological Laboratory of St. Louis University.

pulverized. It is, however, very hygroscopic and, after a few hours' exposure to the air, becomes leathery and rapidly loses its infectivity. Experiments are now being carried to compare quantitatively the virulence of dessicated cord with that of fresh cords, after the method described by Harvey and McKendick.

Harvey and McKendick have constructed a curve of infectivity which corresponds very closely to a curve representing the loss of weight of a cord when dried by the method of Pasteur. These writers state: "We may conclude that the small amount of water remaining in the cord from the ninth day onward is insufficient to keep the virus infective." It is the general belief that the attenuation of a rabic cord depends primarily upon its loss of water. Our work leads us to believe that it is the *method* of extracting the water which results in attenuation or destruction of virulence, and not the extraction of the water *per se*. To state it differently, slow dessication attenuates and destroys the virus directly by reason of the concentration of salts and other substances which are in solution in the brain and cord. The action is therefore, in essence, a chemical one.

Dessication of frozen material avoids any concentration of those intra- and extra-cellular salts or substances which are at the ordinary temperature in solution With this method absolute dryness proceeds, cell by cell, from the surface.

If this proposition be true, Vansteenberghe's and Marie's successes and failures are easy of explanation. These authors emphasize that the cord must be spread in a very thin layer and the vacuum produced very rapidly. A vacuum rapidly produced will freeze a small quantity of water in a bell jar. The success of these workers in our opinion depended upon the freezing of their thinly spread material and its drying without concentration. Further support is given to our hypothesis by the fact that exposure of our thoroughly dried material to ordinary air destroys its virulence completely within a few hours. The absorbed atmospheric moisture is, in this case, sufficient to redissolve some of the salts and other soluble material in a most concentrated state and destroy by chemical means the enclosed virus.

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Marie: L'étude Expérimentale De La Rage.

Harvey and McKendick: The Theory and Practice of Anti-Rabic Immunization. Calcutta.

CARBO GASOLINE METHOD FOR THE DISINFECTION OF BOOKS.*

By W. L. BEEBE.

The difficulties that prevent the disinfection of books seems to be numerous. If a gaseous disinfectant is used it is very hard to have it penetrate all parts. Steam injures the book to some extent. An ideal method would therefore seem to be to use a liquid that would not be injurious and still kill all the pathogenic organisms that frequently infect them. The writer has found that gasoline does not injure books even after they are soaked in it for two to three hours if they are quickly dried. Gasoline has the advantage of dissolving fats and oils and theoretically it would appear that if a germicide was added it would act on bacteria in a dry and perhaps a wet medium. Several disinfectants which were soluble in gasoline were tried but carbolic acid was the only one that seemed to be efficient.

In testing the efficiency of carbo gasoline it was necessary to devise special technique. A very volatile gasoline which is termed 88 Baume or gas machine gasoline was used. Liquified carbolic acid crystals were added to the gasoline in different amounts and the disinfecting properties tested on several organisms by the following procedure. A small amount of a 24-hour bouillon culture of the organisms to be tested was smeared on a half of a 22 m. m. cover slip which had been cut in two with a glass cutter. They were then dried in a petri dish in an incubator at 35° C. for 15 to 20 minutes. After drying they were put in a tube of carbo gasoline and removed at intervals of two and one-half minutes up to fifteen minutes. The gasoline was allowed to evaporate and the cover slip was placed in a tube of sterile bouillon. It was found that the carbolic acid which remained on the cover slip immediately went into solution in the bouillon. The amount of carbolic acid which went into solution had no inhibitory effects on the growth of the organisms. In nearly all cases a parallel test was made with an aqueous solution of carbolic acid of the same strength as the carbo gasoline, either by the above described coverslip method or the drop method.† Tests with the *staphylococcus pyogenes aureus*, *B. typhosus*, *B. coli communis*, *Bact. diphtheriae*, *Bact. anthracis* by this method resulted as follows:

* Read before the Laboratory Section of the American Public Health Association at Milwaukee, September, 1910.

† The procedure in this method is to add five drops of a 24-hour culture of the organism upon which the disinfectant is to be tested, grown on beef broth, to 5 c. c. of the disinfectant. The mixture is then well shaken and subcultures are made from it at intervals of two and one-half minutes to fifteen minutes.

Bacillus diphtheriae—24 hour bouillon culture at 36° C.

Drop and cover slip methods. Room temperature.

	Disinfect-ants.	Strength of Solution.	Results of exposure to disinfectants for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline......	Carbolic Acid.....	1—100	—	—	—	—	—	—
Do	Do	1—200	—	—	—	—	—	—
Do	Do ...	1—400	—	—	—	—	—	—
Distilled water..	Do ...	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—
Do	Do ...	1—400	+	+	—	—	—	—

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

Bacillus coli communis—24 hour bouillon culture at 36° C.

Drop and cover slip method. Room temperature.

	Disinfect-ant.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline ..	Carbolic Acid....	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—
Distilled water..	Do ...	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—

+ means growth. — means no growth. Subcultures incubated for 6 days at 36° C.

Staphylococcus pyogenes aureus—24 hour bouillion culture at 36° C.

Cover slip method. Room temperature.

	Disinfec-ants.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1— 65	—	—	—	—	—	—
Do	Do ...	1—100	+	—	—	—	—	—
Do	Do ...	1—135	+	+	+	+	+	+
Do	Do ...	1—200	+	+	+	+	+	+
Distilled water..	Do ...	1— 65	—	—	—	—	—	—
Do	Do ...	1—100	—	—	—	—	—	—
Do	Do ...	1—135	+	+	+	—	—	—
Do	Do ...	1—200	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures were incubated 6 days at 36° C.

B. typhosus—24 hour bouillion culture at 36° C.

Drop and cover slip method. Room temperature.

	Disinfectants.	Strength of Solutions.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—
Do	Do ...	1—400	+	+	+	+	+	+
Distilled water..	Do ...	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—
Do	Do ...	1—400	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures were incubated 6 days at 36° C.

Bacillus anthracis—6 days agar culture in bouillion suspension.*

Cover slip method. Room temperature.

	Disinfectants.	Strength of Solution	Results of exposure to disinfectant for					
			15 min.	30 min.	1 hr.	4 hr.	6 hr.	24 hr.
Gas Machine Gasoline.....	Carbolic Acid....	1— 35	+	+	+	—	—	—
Do	Do ...	1— 65	+	+	+	+	+	+
Do	Do ...	1—100	+	+	+	+	+	+
Distilled water..	Do ...	1— 35	+	+	+	+	—	—
Do	Do ...	1— 65	+	+	+	+	+	+
Do	Do ...	1—100	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

* Cover slips dried 48 hours at 36° C. after smeared with suspension.

Upon examining the tables it will be seen that the aqueous solution of carbolic acid was a little more efficient than the carbo gasoline, but even a one per cent. solution was sufficient enough to kill all non-spore producing organisms in less than five minutes.

It is also essential that a book disinfectant be efficient whether the books be absolutely dry or slightly moist. It was therefore decided to wet small pieces of sterile filter paper with the organisms to be tested and put them in a solution of carbo gasoline and remove them at intervals of two and one-half minutes up to fifteen minutes.

Pieces of filter paper prepared in the same way were put in the same strength aqueous solution of carbolic acid with the following results:

Staphylococcus pyogenes aureus—24 hours bouillion culture at 36° C.

Exposed on wet filter paper. Room temperature.

	Disinfectant.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1— 35	—	—	—	—	—	—
Do	Do ...	1—100	—	—	—	—	—	—
Do	Do ...	1—200	—	—	—	—	—	—
Do	Do ...	1—400	—	—	—	—	—	—
Do	Do ...	1—1000	+	+	+	+	+	+
Distilled water..	Do ...	1—100	+	+	+	+	+	+
Do	Do ...	1—200	+	+	+	+	+	+
Do	Do ...	1—400	+	+	+	+	+	+
Do	Do ...	1—1000	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

Bacillus coli communis—24 hour bouillion culture at 36° C.

Exposed wet on filter paper. Room temperature.

	Disinfectant.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1—200	—	—	—	—	—	—
Do	Do ...	1—400	—	—	—	—	—	—
Do	Do ...	1—1000	—	—	—	—	—	—
Distilled water..	Do ...	1—200	—	—	—	—	—	—
Do	Do ...	1—400	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

Bacillus typhosus—24 hour bouillion culture at 36° C.

Exposed wet on filter paper. Room temperature.

	Disinfectant.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1—200	—	—	—	—	—	—
Do	Do ...	1—400	—	—	—	—	—	—
Do	Do ...	1—1000	—	—	—	—	—	—
Distilled water..	Do ...	1—200	+	+	—	—	—	—
Do	Do ...	1—400	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

Bacillus diphtheriae—24 hour bouillion culture at 36° C.

Exposed wet on filter paper. Room temperature.

	Disinfect-ant.	Strength of Solution.	Results of exposure to disinfectant for					
			2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.
Gas Machine Gasoline....	Carbolic Acid....	1—200	—	—	—	—	—	—
Do	Do ...	1—400.	—	—	—	—	—	—
Do	Do ...	1—1000	—	—	—	—	—	—
Distilled Water..	Do ...	1—200	+	+	+	+	+	+
Do	Do ...	1—400	+	+	+	+	+	+

+ means growth. — means no growth. Subcultures incubated 6 days at 36° C.

It will be noticed that contrary to what would be expected the organisms on the wet filter paper were killed much more quickly than in the dry state, *B. typhosus*, *B. diphtheriae*, and *B. coli communis* being killed in less than two and one-half minutes in carbo gasoline solution of 1–1000. This probably is accounted for by the fact that carbolic acid is extracted from the gasoline by the water. In order to determine this point some experiments on the water extraction of carbolic acid from gasoline were made It was found that about 97 per cent. of the carbolic acid was taken up by the water from the gasoline.

Disinfection of Books.

It was decided to disinfect some books by this method after first infecting them with several different organisms. In all cases 88 Baume gasoline containing 2% carbolic acid was used. The books were opened at the pages where they were to be infected, put in the autoclave and sterilized at 15lbs, steam pressure for 15 minutes. They were then removed and allowed to dry in a sterile chamber. The first book was infected by smearing a small amount of a bouillion culture on the paper with a platinum loop. Three infections were made on six leaves fifty pages apart with *B. typhosus*, *B. coli communis* and *B. diphtheriae*. The book was immediately immersed in carbo gasoline for 20 minutes. It was removed and the infected areas cut out and put in tubes of bouillon. No growth resulted in any of the tubes. Two other books were similarly infected but the leaves were dried for about one hour after infection. They were left in carbo gasoline for twenty minutes. One of the books was dried over night in a sterile chamber before cultures were made. In all 62 inoculations were made, 18 with *Bact. diphtheriae*, 19 with *B. typhosus*, 18 with *B. coli communis* and 7 with *staphylococcus pyogenes aureus*, without growth in any case.

Samples of sputum that were known to contain virulent tubercle bacilli were used to infect two more books. In each case a very large loop full of sputum was placed between two pages, the pages pressed together so that they remained adherent. One book was exposed to the carbo gasoline for 20 minutes before the sputum was dried. The other book was dried for 24 hours before being placed in the carbo gasoline. In all cases control inoculations were made on guinea pigs. Sample (1) was exposed both wet and dry and sample (2) dry only. Thirty days after inoculation the controls and the three pigs that were inoculated from the sputum that was exposed to carbo gasoline in the book were injected with 2 c. c. each of tuberculin. The three controls and the one guinea pig that was inoculated with sputum sample No. 2 died within 24 hours after injection. The two that were injected with sample (1) apparently suffered no inconvenience from the injection of the tuberculin. A post mortem examination of the four pigs that died revealed generalized tuberculosis in all cases. The two inoculated from strain one were chloroformed and autopsied, were found to be fat and free from tubercular lesions. Although one of the pigs died from tuberculosis infection after injection with sputum that had been exposed to carbo-gasoline for twenty minutes this result is not discouraging as it must be taken into consideration that under ordinary conditions sputum would not be present in such quantities in books.

Books that were this far treated by this method were not injured unless the cover was lettered with an oil paint. In such cases if care be taken not to touch the letters before the books are dried no harm is done. This method has been tried on several different bindings, such as leather, cloth and paper and in no case has the binding been affected. Gasoline of a lower specific gravity than 88 Baume can be used but it takes longer for the gasoline to evaporate.

A book can be partially dried after removing it from the gasoline by holding open in front of an electric fan for 2-3 minutes. It will then dry out thoroughly by standing on end with the leaves open. In 24 to 48 hours after disinfection it is ready for use.

If the odor of carbolic acid and gasoline is offensive some of the essential oils, such as peppermint, wintergreen, and cinnamon can be used as a deodorant. The writer has found a mixture of

oil peppermint,	3 parts
oil wintergreen,	1 part
oil cinnamon	1 part

to be very efficient in disguising the odor of carbolic acid.

The advantage of this method is that any one can apply it. The only precaution is to keep the gasoline and book until dry away from the fire.

From the results obtained it is quite evident that carbo gasoline is an efficient disinfectant for books and papers, and probably for clothing that cannot be otherwise disinfected. Perhaps it can also be used for other purposes.

Notes and Reviews*

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

Reviewer's Note—Although many water filter and purification works have been put into service during the last ten years very little is known by the general public of the work which they accomplish.

Believing that such information would prove to be of great interest and value the Reviewer has written to the officials in charge of several slow sand and mechanical filter plants to get data upon costs and results of operation for publication in the JOURNAL. The replies received show that the officials are willing to prepare the data asked for but hesitate to give it out for several reasons. The conditions are not exactly alike at any two plants in the country. The unpurified waters differ radically in composition, the design of various plants have been modified to meet the particular requirements of the Communities which they serve, and the geographical positions of many introduce differences in freight rates, labor, and other factors controlling the cost of operation. For these reasons and because of differences in personal opinion as to the proper classification, items that appear as charges for operation at one plant are often carried as charges for maintenance or betterments at others.

In every instance where data have been submitted for publication the compilers have stipulated that the conditions which prevail at their respective works shall be described in full in order that the readers may be able to interpret the figures correctly and give due justice to the plants.

Some officials have declined to send any information for the reason, as they say, that it is an easy matter to misinterpret such data, thereby injuring the plant or the officials.

It is believed, however, that many apparent discrepancies can be reconciled and that eventually a standard method of cost keeping could be developed which can be adopted by all purification works by using a few explanatory remarks.

With this end in view officials are requested to furnish the Reviewer with copies of the forms which they use in tabulating data together with statements describing the kinds of items which they include under the headings. Having received this information, together with suggestions as to the items which it would be well to combine, the Reviewer intends to compile a form to be submitted for approval to officials in charge of the various purification works.

Meanwhile the JOURNAL publishes this month information received from several plants and invites the attention of Water Works Officials to the movement. If the data prove to be of sufficient interest a more extended line of data will be solicited for publication monthly.

EDITOR'S NOTE: Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

DATA FROM WATER PURIFICATION WORKS.

CITY	Population	Source of Supply	Methods of Purification	Av. daily yield Million Gallons	Washwater per cent.	Parts per 1,000,000 Raw Water Turbidity	Raw Water Color	Raw Water Total Hardness	Pure water Turbidity	Pure water Color	Pure water Total Hardness	Nos, of Bacteria Per Cu. Cent. Raw water	Nos, of Bacteria Pure water	No. of Deaths from All causes	Typhoid Fever	Pulmonary Consumption	Period November 1910.
Albany, N. Y.....	100,253	Hudson River	16 rapid sand, 8 slow sand filters.	21.1	3.7	42	40	66	0	28	66	87,200	180	138	0	15	Nov'r
Cincinnati, O.....	364,463	Ohio River....	Rapid sand filters using iron and lime as a coagulant.	44.1	3.4	50	...	110	0	...	126	1,100	60	512	1	59	"
Columbus, O.....	181,511	Scioto River	Water softening and Mechanical filtration.	13.4	0.8	6	36	404	0	11	100	300	2	186	2	18	"
Harrisburgh, Pa..	67,000	Susquehanna River	Mechanical filtration.	8.7	2.2	36	2	102	0	0	104	1,100	4	87	7	1	"
McKeesport, Pa..	42,694	Youghiogheny River	Water softening and mechanical filtration.	3.4	0.4	very slight	0	501	0	0	88	160	44	57	3	3	"
Toledo, O........	168,000	Maumee River	Mechanical filtration.	15.1	2.2	50	31	100	0	10	104	4,600	59	166	12	......	"
Youngstown, O....	80,000	Mahoning River	Coagulation, sedimentation, mechanical filtration.	8.28	4.0	26	22	157	0	0	158	35,300	268	78	3	6	"
Washington, D.C.	348,460	Potomac River	Slow Sand filtration.	57.9	0.2	7	0	115	0	0	109	1,100	25	553	9	54	"

NOTE: Letters were sent to many other water purification works and replies received stating that data would be sent forward but the information has not been received in time to print it in this issue.

Some interesting data were furnished in regard to costs of operation and quantities of chemicals used, but as several Plants stated that they deemed it to be inexpedient to publish the cost data the information has been omitted here.

PERSONAL HYGIENE NOTES.

PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Dreams as Tokens of Condition.

In his fascinating "Physiologie des Menschen," George von Bunge calls attention to many facts of experience which deserve to be more widely known than they are at present. Among the observations which he records are some in regard to dreams which are easily verified and which convey certain enlightening suggestions. These are familiar enough to specialists in nervous disease but are not often brought to the attention of the laity.

The human brain is a station for the reception and discharge of nerve-impulses. Throughout life it is beset by stimuli and prompt in response. The vast majority of the coursing impulses are unaccompanied by the phenomena of consciousness. A select minority, zigzagging about in the cerebral cortex, have the conscious accompaniment. When the sensory paths are freely open and the motor outlets also this is the waking consciousness, the reaction to immediate, present environment. When the sensory paths are more or less completely blocked and the motor channels too are obstructed, consciousness if existent at all is of the dreaming order and little related to the environment.

Now it may be granted, in all probablilty, that dreamless sleep is desirable. But if dreams do come they may be of a character to hinder the restorative processes in the nervous system, or they may be relatively harmless. If the circumstances, pursuits, and emotions in the dream are quite similar to those of the preceding day, it may be assumed that the same elements of the brain which were most used in waking hours are still subjected to wear and tear. Many people will recognize that a long course of dreaming over recent interests renders sleep peculiarly unrefreshing. The chess-player, who reviews the situations of a hard game, the recent victim of dental torture, who is forced to live over and over the extraction of a tooth, the debtor hounded by collectors in endless succession—these can testify to the unsatisfying nature of their sleep. It is a law of brain fag, that the neurones excessively used become excessively irritable.

If one cannot find complete oblivion in sleep the second choice is a world of dreams utterly detached from the routine of waking life. Such a world is likely to be entered nightly by the man of happy and healthy constitution. In it his experiences are drawn from distant periods and his companions are those who have been long absent. It does not seem entirely whimsical to ask whether such dreams do not afford one a vacation. So far as the good effects of an outing are secured through altered trains of thought and unaccustomed feelings this must be true. The possibility of such vacations without expense or loss of time from one's work is novel but not unthinkable. The fortunate dreamer has many surprising adventures in which the emotion is generally tempered to mildness.

The underlying physiology is easily interpreted. When the impulses have ceased to flow in the much employed pathways used in the life of the day, it is the unfatigued because long unused elements of the brain that create a stir. Their suggestions are from far afield. Their random activity scarcely hinders the recuperative processes in the fatigued neurones. If an analogy may be indulged in, the candles which have been burning steadily so long are extinguished and the flame which kindles in consciousness crowns now one and now another of a great collection of candles a little removed from the familiar centre of interest. If there is waste involved it is widely distributed and falls upon substance of secondary value.

It does not seem too much to claim that a distinct danger signal is set whenever one's dreams are found to pursue persistently the round of the day's duties and cares. Cumulative fatigue is threatened. The indication may be of actual overwork but it may also point to lack of diversion. The question, "Am I tired or am I lazy?" though it is usually a jocular one is really important. A man who wakes with sensations of dullness and indisposition may answer it according to the dictates of his temperament, and his decision may easily be wrong. If he is self-indulgent he may fail to make proper efforts to shake off indolence. His capacity for activity will shrink as he becomes over considerate of his feelings. Another, tenacious and ambitious by nature, may disregard the signs of approaching exhaustion until the mischief is serious. Will not the prevailing character of the dreams provide a helpful diagnostic sign when one is called upon to decide whether he will reduce his work or increase his application? As long as there is no insomnia and as long as the dreams are marked by variety, inconsequence, and irrelevancy, there must be a strong presumption of laziness—or indigestion—regardless of the inglorious and unwelcome aspect of the conclusion.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Massachusetts.*
(*Reviewer.*)

Politics in the Ohio State Board of Health. Sanitarians the country over have for some years looked to the Ohio State Board of Health as one of the ablest and most progressive in the United States. Under Dr. Probst's general leadership as Secretary, with Mr. R. W. Pratt in charge of the engineering division and recently with Mr. B. R. Rickards as chief of laboratories, the Ohio organization has been a model one and a source of inspiration to many states in the middle West. In December, 1909, Mr. John W. Hill, of Cincinnati, at an earlier period connected with the Philadeplhia Filtration Plant, was appointed a member of the board. With the death of two members of the board last summer power passed into new hands. On December first a committee consisting of Mr. Hill and Dr. Warner was appointed to investigate to affairs of the department The committee's first step was to obtain a list of expenditures for the year. An inspection of the Secretary's office, the engineering department and the laboratories was then made, which altogether consumed forty-five minutes. A few days later eleven members of the staff, including Mr. Rickards, were dismissed on two days' notice. It was expressly stated that the work of the experts so dismissed was satisfactory. The ground assigned for the action was economy, but inquiries made on the ground by the secretary of the Ohio State Medical Association and others have failed to elicit any comprehensible reasons for it. The result can scarcely fail to be a demoralization of the work of this vital department of the state government. Self-respecting sanitary experts will hesitate long before accepting positions under this board unless it shall be radically reconstituted; and the bad effects of the affair will be felt everywhere in the general distrust of state and municipal positions which often deprives the community of the public services of the trained experts it so sorely needs.

C.–E. A. W.

* State and City Boards of Health and other health organizations are requested to send copies of their reports, sanitary bulletins, etc., to the above address for review.

Failure to Report Contagious Disease. A citizen of Merrill, Wisconsin, has been arrested and fined upon complaint of the local health officer for failure to report a case of scarlet fever in the family of the defendant. The father of the child knew that the affliction was scarlet fever, but he did not wish to be quarantined, and hence attempted to conceal the presence of the disease.

Unsanitary Location of Cream Separators.* The district attorney of a certain county has been requested by one of the pure food inspectors to bring an action against farmers who keep their cream separators in unsanitary places. In one case a farmer was arrested and fined $25 and costs amounting to $39.25 for keeping and operating his cream separator in a pig pen. This is a work in which the local health officer should co-operate with the food inspector.

Healthfulness of a Community as a Business Asset. "The healthfulness of any community depends in a large measure on the efficiency of the public health administration. Natural advantage is also an element to be considered but a community is often branded as unhealthful and hence not a desirable place to live in on account of laxity in the enforcement of public health laws and indifference to the role which preventive medicine plays in safeguarding human life. Is it not strange that the business interests of a community will intentionally deprive themselves of so valuable an asset, as the reputation of being situated in a healthful locality?"*

Proposed Ordinance Requiring Cure of Parasitic Diseases.* The common council of the city of Milwaukee has pending before it an ordinance requiring parents to cure their children of certain contagious and infectious diseases within a specified time under penalty of a fine of from one to fifty dollars for each offense. The following diseases are enumerated in the ordinance with the time limit for the cure of each disease:

Tinea circinata (Ringworm)	Thirty days
Impetigo contagiosa	Thirty days
Molluscum contagiosa	Twenty-one days
Infectious dermatitis	Thirty days
Pediculosis (Lice)	Fourteen days
Tinea tonsurans (Ringworm of scalp)	Three months
Favus	One year
Filthy condition of body	Twenty-four hours
Scabies	Fourteen days

New Refuse Disposal Plant.† Topeka has set the pace for other Kansas towns in the construction of a modern incinerating plant for the disposal of the city's waste and refuse.

* The Wisconsin State Board of Health Bulletin, July-Sept., 1910.

† Kansas State Board of Health Bulletin, Nov., 1910.

Abolishment of Public Drinking Cup.* The rule abolishing the use of the common drinking cups on railroad trains, in railroad stations and in the public, parochial or private schools went into effect on September 1, 1910. We are pleased to state that railroad companies have, without exception, abolished the use of the unsanitary common drinking cup. Many of the public and private schools of the state have already installed sanitary drinking fountains and many more are planning to abolish the use of the common drinking cup in a short time.

Registration of Hogs and Babies.† A farmer exhibited a registered hog at the State Fair and was awarded a premium of $100 and a blue ribbon; up to the present time no provision has been made to register Kansas babies.

Diphtheria and Its Prevention. The Virginia Health Bulletin for November, 1910, is devoted to a discussion of diphtheria and its prevention. There are ten pages devoted to the cause, diagnosis, treatment and isolation, closing with an extract from the rules and regulations of the State Board of Health regarding diphtheria and finally on a sheet to be torn off are bedside directions for the treatment.

Registration of Deaths in North Carolina.‡ "Mortality returns for a number of towns and cities in the State show an annual death rate so low as to make it extremely probable that some of the deaths have not been registered. Look up your annual death rate. Beginning December 1st, a number of these towns with death rates under ten per thousand of the population will be investigated by the State Board of Health. If deaths that have occurred during the past year are found unregistered, the penalty of the law will be enforced."

* Wis. State Board of Health Bulletin, July-Sept., 1910.

† Bulletin, Kansas State Board of Health, Nov., 1910.

‡ Bulletin N. C. State Board of Health, Oct., 1910.

MUNICIPAL SANITATION NOTES.

CHARLES V. CHAPIN, M. D.,
Superintendent of Health, Providence.
(*Reviewer.*)

School Dentistry. Perhaps the city of Cambridge, England, has done more than any other English-speaking community to correct dental defects in its school children. The municipal dentist, Dr. A. W. Gant, recently gave a very interesting and suggestive address on school dentistry.* He recognizes that at present it is impossible to expect to secure the prompt filling of all carious teeth found in school children. He therefore, considers it important to concentrate effort upon those ages, and upon those teeth in which the greatest results can be obtained for the least expenditure. In his experience he has found it necessary to secure the co-operation of the children. To secure this it is necessary that the dentistry should be as nearly painless as possible. For this, and other reasons, it is necessary to discover and fill the cavities when they are as small as possible. Hence, he finds it impracticable to rely upon the regular medical inspectors to discover carious teeth. It is necessary that a dentist should make the examination. A mirror must be used and adequate light provided. He would concentrate attention upon the permanent molars. He says that except in cases of considerable irregularity the incisors do not become carious as a rule before the tenth year. Even then they will remain sound provided that the grinding capacity in the molar region is not impaired. Thus the key to the whole situation is the preservation of the first permanent, or so called six-year molars. However, as the first molars are somewhat irregular in the time of their appearance, it is necessary to begin dental inspection and treatment during the fifth year. Examination and treatment should follow yearly during the next four years. In this way a good set of molars can be secured for the child with the least expenditure of time and money, and with the least production of pain.

Diphtheria Outbreaks Terminated without Use of Cultures. It is quite common to read in the Journals of outbreaks of diphtheria in schools and institutions which have been "stamped out" by cultures from all members of the institution and a strict isolation of carriers. One may per-

* Public Health, 1910, XXIV, 92.

haps hesitate to believe that these outbreaks were in all cases "stamped out" rather than that they died out, if it appears that outbreaks frequently do die out even in schools without any very active control. Garrett* reports about a dozen instances of the occurrence of diphtheria in different boarding schools in Cheltenham. In no instance did any extensive outbreak occur. The maximum number of cases in any one outbreak being 9. No cultures were taken and there was practically no isolation of contacts.

* Public Health, 1910, XXIV, 100.

SANITARY ENGINEERING NOTES.

ROBERT SPURR WESTON, Boston, Massachusetts.
(*Reviewer.*)

Effect of Sewage on Concrete. Weston,[1] in a letter to the editor of the Engineering Record, published observations and analyses of concrete which has been attacked by septic sewage, proving that sulphuric acid is produced by the oxidation of hydrogen sulphide evolved from decomposing sewage. This attacks calcium silicate, and more especially the calcium aluminate of the cement, forming sulphate of alumina and calcium, which latter do not withstand the action of the water. They leach away and the structure of the concrete breaks down in consequence. A more thorough airing of the exposed surface would diminish the action. Most of the action takes place near the surface of the liquid and in confined spaces where the heavier hydrogen sulphide tends to collect.

Richardson[2] calls attention to a common error concerning the composition of Portland cement. The Carnegie laboratory researches have established the fact that Portland cement is a mixture of orthocalcium silicate and tricalcium aluminate or its iron analog together with a certain amount of free crystaline calcium hydrate.

Karl[3] gives as a result of his experience that the deterioration of well made concrete exposed to sea water is seldom if ever due to the effect of freezing weather. The same holds true for cement sewer pipe although the latter erodes more rapidly than does vitrified tile pipe. Has observed that certain sulphur spring waters at West Baden, Indiana, attack concrete. He hopes to learn of American trials of the iron ore cement adopted by the Prussian Government for its marine work.

Dittoe[4] notes a case where the concrete in a septic tank was attacked between the high and low water marks, the limits of the rise and fall of the sewage in the tank before and after storms.

Burdiarty[5] gives an account of the elaborate experiments made by a committee appointed by the Prussian Minister of Public Works to investigate the behavior of hydraulic compounds in sea water, for numerous

1. Eng. Rec. **61**, 714.
2. Eng. Rec. **61**, 741.
3. Eng. Rec. **62**, 28.
4. Eng. Rec., **62**, 140.
5. Eng. Rec., **62**, 237.

sea water structures have been built of mortar and concrete made up of cement or other hydraulic compounds, such as hydraulic lime, trass, etc. In the opinion of Dr. Michaelis the action of free lime in cement would be rendered harmless by the addition to the mortar of materials rich in silica which would combine with the lime, that is puzzolanic materials, such as trass. The committee investigated the effect of the addition of trass to a cement poor in lime, also to one rich in lime in both lean and rich mixtures. It appears from the results that with the increasing addition of sand, the compressive strength decreases considerably, a fact sufficiently known from experience. This decrease takes place with both cements according to the same law before the addition of trass, also reduces the strength considerably, especially with the lean mixtures. This reduction is greater with a cement poor in lime than one rich therein. The action of the sea water is a deteriorating one only in the lean mixtures. In the rich mixtures the sea water samples have greater strength than those exposed to fresh water. Additions of trass are liable to reduce the injurious action of the sea water in the case of lean mixtures. With the cement rich in lime the favorable action of the added trass ceases within a year's time. Experiments with concrete blocks made with cement and cement-trass mixtures show that cement rich in lime is more suitable for structures in sea water than one poor in lime—a result contradictory to the actual views—that the addition of trass in cement intended for use in sea water is of limited value and that it is desirable in sea water to use dense mixtures and to have the blocks hardened in air or under sand as long as possible before placing them in the sea.

Sewage Question and Treatment of Trade Effluents.* A paper presented before the engineering conference in connection with the Congress of the Royal Sanitary Institute. This excellent and instructive paper is concerned chiefly with the administrative and legal features of sewage disposal. It describes the chaotic condition of the present British law in practice and commends very heartily the recommendations of the Royal Commission on Sewage Disposal, the two leading paragraphs of which are as follows:

"We are, therefore, of the opinion that the law should be altered so as to make it the duty of the local authority to provide such sewers as are necessary to carry trade effluents as well as domestic sewage, and that the manufacturer should be given the right, subject to the observance of certain safeguards, to discharge trade effluents into the sewers of the local authority if he wished to do so."

* Watson, John D. Eng. Rec., **62**, 382.

"We do not think it possible to provide by direct enactment what these safeguards should be. In each district it would probably be desirable that the local authority should frame regulations which should be subject to confirmation by a central authority. In most cases, however, these regulations should provide definite standards for the different manufacturers as regards preliminary treatment and it appears from the evidence that manufacturers would much prefer to have standards to work to."

Incidentally the author notes that a great improvement in the condition of the streams of England has been accomplished notwithstanding the great growth of industry since movements looking towards the purification of the streams were inaugurated.

VITAL STATISTICS NOTES.

MARSHALL LANGTON PRICE, M. D., Baltimore, Md.
(*Reviewer.*)

Statistical Material in the Exhibition of the American Association for the Study and Prevention of Infant Mortality, Held at Baltimore, November, 1910. The American Association for the Study and Prevention of Infant Mortality, in connection with its Second Annual Meeting, held an exhibit designed to present to the public in a manner both clear and striking, the salient features of the problem of Infant Mortality. The Exhibit was designed to be the connecting link between the general public and the scientific work of the Association as developed in the general sessions and section meetings.

As the exhibit was necessarily to consist in large part of statistical material, a considerable amount of time and thought was given by the Exhibition Committee to how best to put this statistical data before the public in a form in which it would be best understood and assimilated. As a general result of this attempt, the statistical charts and diagrams exhibited, were extremely simple and striking in the main and seemed to be easily understood by those who visited the exhibit. In other cases the statistical facts were set forth in models, also sufficiently simple to be readily comprehended. One of these models was entitled: "What becomes of a hundred babies born in Baltimore." The model was divided into three compartments surrounded by stone walls and divided by arched gateways. The ground was represented by about two inches of sand. The babies were represented by small celluloid dolls about two inches high. The first compartment showed a hundred babies born December 31st, 1910, passing through the gateway into the first year of life. In the compartment representing the year 1911, seventy-five babies were shown moving to the entrance of their second year and leaving behind them the graves of twenty-five dead infants represented by small graves and tombstones, the latter inscribed with the causes of deaths. In the last compartment seventy dolls were proceeding toward the entrance of their third year, leaving behind them five graves with the appropriate tomb stones.

Another model consisted of a table at the back of which rose a background colored to represent the months of the year. A ledge toward the upper part of the model supported twelve wooden blocks, one for each

month, each one-sixteenth of inch in height, indicating one death. This section was entitled "When Babies Die in Maryland." A second series of blocks of corresponding sizes were supported by another ledge underneath this, the blocks being colored to represent the various causes of death. This was entitled "How Babies Die in Maryland." On the table top below were shown flies, dirty bottles, artificial foods and other important factors causing infant mortality. This was entitled "Why Babies Die in Maryland."

Another interesting model was a red flash light showing with each flash the death of a baby somewhere in the civilized world. This light was timed to flash six times a minute or once every ten seconds.

A beautiful and elaborate series of charts of large size and in colors was prepared by the United States Census Bureau, showing the causes of infant mortality and the extent of deaths under two years in United States and in the various states. The most impressive charts to the general public seemed to be those showing the miserable condition of birth registration in the United States. One of the most impressive charts to those familiar with figures was the chart of the Census Bureau showing the "Probability of Living One Year" and the "Probability of Dying within a Year." A similar chart was shown by another exhibitor. These charts certainly gave a much more clear and intelligible view of infant mortality than the charts of expectation and duration of life, though the latter were also shown in the Census Bureau's exhibit.

Bulletin Hebdomadaire du Bureau de Statistique de La Ville de St. Petersbourg.* This bulletin is published for the week of October 30th to November 4th, 1910. In addition to the regular morbidity and mortality figures for this week it contains material throwing interesting light upon the cholera situation in Russia. The figures begin with the week of August 19th to August 23rd, 1908, in which week there were four persons attacked with cholera. In the next week there were eighty-four deaths and two hundred and sixty-six cases. The disease reached its height during the week of September 7th to 13th, in which there were 2260 cases and 1187 deaths. During this year cholera reached its height with 9,371 cases and 4,390 deaths. There has since been a steady decline, the deaths in 1909 numbering 2,883. Up to the date of the issue of the bulletin there had been 1,822 deaths during 1910.

Table 5 of the Bulletin gives a study of the cholera epidemic by months. During 1908, September was the month at which the disease reached its height. During this month there were 6,178 cases and 3,075 deaths.

* Weekly Bulletin of the Bureau of Statistics of St. Petersburg. Russian and French.

During 1909, the month of greatest incidence was June and July, while in 1910 the disease was heaviest in July and August.

The comparison of these figures with typhoid fever and other intestinal diseases is interesting.

It appears from the Russian figures that the greatest incidence of cholera is one or two months earlier than that of typhoid fever in this country and in Europe.

The seasonal incidence of the cholera morbidity corresponds closely with that of the cholera mortality as would naturally be expected considering the fact that the fatal cases of cholera are usually extremely acute. In typhoid fever, on the other hand, the greatest incidence generally proceeds the highest mortality by about one month.

Another interesting fact disclosed by this table is the great excess of males over females among those attacked. The figures for the one year available will illustrate this.

During 1909, there were 4,792 males attacked and 3,534 females.

The table of cases and deaths by age shows some very interesting results. The greatest number of persons attacked fell in the age group between 20 and 30 years, while the greatest number of deaths occurred between 30 and 40 years. It is also extremely interesting to note that 54 infants under the age of six months were attacked, of whom 44 died.

BOOK REVIEWS.

A Text-Book of General Bacteriology. By Edwin O. Jordan, Ph. D., Professor of Bacteriology, in the University of Chicago and in Rush Medical College. Second revised edition, octavo of 594 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1910. Cloth, $3.00 net.

The first edition of Jordan's text book has become so widely and so favorably known that an extended review of the second edition is entirely unnecessary.

In revising the first edition the author has kept the same general arrangement of subject matter but has brought the book up to date by recording the results of such progress as has been made in the science since the first edition went to press. In doing so he has stated the facts fully yet conservatively, not attempting to throw too much weight on data not yet fully verified. Among such additional material, poliomyelitis is discussed in some detail, pellagra receives passing mention in a paragraph on "Bakery Fermentations," while under "Bacteria in the Industries" the retting of flax and hemp is considered. The concentration of diphtheria antitoxin also receives its share of attention under the chapter on "Diphtheria."

A few new illustrations have been added or substituted for old ones and the few errors which are bound to creep into any book, however carefully the proof-sheets are read, have been corrected.

As we said in reviewing the first edition, the author has succeeded in producing a book at once sufficiently elemental for the student while at the same time of unquestionable usefulness as a reference work.

BOOKS RECEIVED—

Insects and Disease—Doane, *Henry Holt & Co.*

Tenement Inspector—Price, *Gray Pub. Co.*

Genesis—B. F. Talmey, *Practitioner's Pub. Co.*

Proceedings of the Thirtieth Annual Convention of the American Water Works Association, New Orleans, April, 1910.

Proceedings of the Fourth Annual Meeting of the Association of Life Insurance Presidents.

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EDITORIALS

EDUCATIONAL OPPORTUNITIES OF THE HEALTH DEPARTMENT.

THERE is probably no division of a Department of Health which can accomplish more tangible results in the saving of lives than a Division of Publicity. The most serious enemies of public health, like tuberculosis, and infant mortality, can only be met by the individual citizen in the individual home. Good sanitary laws and effective systems of inspection, valuable as they are, will accomplish only a small part of what can be attained by spreading knowledge of the ways in which disease spreads, and the ways in which it is prevented, among the mothers who bring up the babies and the men who pay rent in the tenements and work in the stores and factories. The most progressive boards of health have seized this opportunity. Chicago issues a weekly bulletin which is so well edited that its health cartoons and pithy statements of sanitary truths are quoted all over the country. 7,000 copies of this bulletin are printed and sent to every doctor, preacher and school in the city and to anyone else who may be interested. The material is given to the morning dailies for use on Sunday and the bulletin goes out on Monday. In addition, the Chicago health department maintains a special press service for church papers, labor papers, papers published in foreign languages, etc., and sends out

weekly bulletins to be posted on the bulletin boards in factories and stores. State boards of health have done very valuable work along similar lines through the circulation of monthly bulletins and leaflets dealing with particular communicable diseases. It is perhaps not invidious to mention the bulletins of the Virginia Health Department as specially notable for effective presentation and soundness in subject matter.

It is obvious that the successful conduct of such educational work demands special qualifications on the part of the editor. It is unfortunately true that some of the state health boards which have gone actively into this field have at times sacrificed scientific accuracy to the exigencies of dramatic effect and in a number of cases the official pronouncements of such boards have tended to foster the ancient errors from which modern sanitary science is gradually being freed. The official in charge of publicity work must first of all have a thorough grasp of the scientific principles and the established facts relating to the spread and the prevention of disease. In addition to this, however, he must be a master of the peculiar technique of publicity and the combination is a rare one.

The chief opportunity for the Division of Publicity lies in the development of the weekly bulletin in a city and the monthly bulletin in a state. Each of these documents might well be printed in an edition large enough for wide distribution and might include a chart, diagram or cartoon illustrating some timely sanitary lesson, further emphasized in a brief editorial. Tabulated vital statistics could be reduced to a minimum and the general conclusions to be drawn from them in regard to health conditions and the activities of the department set forth clearly in the text. Special arrangements should be made for giving the "live" matter in the bulletin to the press in such form and under such conditions as to insure its publication.

With a Division of Publicity once established many special opportunities for educational usefulness will naturally enough suggest themselves. The annual reports of the Board, the circulars issued by the Bureau of Contagious Diseases and indeed all the popular publications of the Department would profit by skilled editorial supervision.

Ultimately, there might be developed under the Division of Publicity a lyceum service such as has been developed in Chicago and by Dr. Hurty and his associates in the work of the State Board of Health of Indiana. If the Department of Health were prepared to furnish effective lectures with lantern slides to schools, churches, women's clubs, labor unions, etc., it could do an immense amount of valuable educational work. In Chicago

the moving picture films of The Acrobatic Fly and The Man Who Learned, have been exhibited by the Health Department in the nickel theatres with success.

The preparation of exhibits which is coming to play such an important part in the public health campaign might also be assigned to the Division of Publicity if it seemed desirable to do so.

It is granted that all these agencies may be so misused as to be merely spectacular, to discredit the Health Department and to disseminate half-truths which are more dangerous than ignorance. These are arguments for caution, however, but not for inaction. The aims of sanitary science can only be attained by the individual effort of the members of the community and somehow the knowledge upon which they are to act must be brought to their doors. A properly conducted educational campaign is the only means of securing intelligent co-operation in the private and personal conduct which underlies public hygiene and sanitation; and at the same time it develops a public interest which insures moral and financial support for the more definite organized activities of the health department.

C.-E. A. Winslow.

PELLAGRA.

THE recognition of pellagra in the United States has proven to be not only an occurrence of much local importance, but has apparently also served as a stimulus to increased interest in this disease in the European medical world.

In our own country we have seen observations, reports, literature, etc., multiply with almost explosive violence. A national society has been established and various commissions appointed for the study of this new addition to our nosology. In England a British Commission has been formed, and a field commission sent to Italy for the study of this disease. And now the Italian Government has appointed a Commission for the study of new scientific views relative to the etiology and prophylaxis of pellagra.

It is reported that an eminent European scientist when he learned that pellagra had been recognized in the United States, said, "I am sorry—and I am glad," explaining that he was sorry for the affliction, but glad that the question of pellagra had become acute to the American profession, for he would now expect American energy to clear up the confusion which existed with regard to pellagra.

In a way, it may be said that the present status of this etiological question comprehends two general lines of thought. First, the traditional view that pellagra is a maize food-poison, allied to ergotism; second, that it is a disease due most likely to some animal parasite. This latter view is gaining force constantly as is abundantly evidenced by the fact that the Italian Government has felt called upon to appoint a Commission for the scientific study of this new idea.

It is, however, a healthy sign and one full of promise. For it cannot be denied that corn in Italy has become somewhat of a scientific dogma in the domain of pellagrous etiology, and to some even more—a dogma which it would be almost profane to question. This is an unwholesome position for science to assume and has in all likelihood done much to prevent further advance.

This parasitic idea of pellagra, first suggested by Sambon in 1905 and recently much amplified by him, has been followed by Alessandrini of the University of Rome. Sambon contends for an insect-born, protozoal parasite, and Alessandrini apparently for a water-born, nematode worm

of the genus Filaria. That some suggestion similar to that of Sambon was not earlier made is worthy of remark. It is none the less to Sambon's credit, and only serves to emphasize this same dogmatism already noted.

Dr. Sambon has developed and defended his idea in a recent very able report to the British Commission. Without attempting to discuss this report there are one or two suggestive points in this connection.

Sambon's theory is at present based solely on epidemiological data and is unsupported by laboratory work. Sambon himself, with much force, has pointed out that epidemiological data are often of as much weight as laboratory data, and perhaps less susceptible of wrong interpretations. The scientific world, however, will doubtless await laboratory findings.

The greatest positive value of Sambon's work at present is definitely to point out the inadequacy of the corn theory, in its present state, to explain existing facts; and this is an achievement of no small importance. For, whatever else it may do, it must inevitably result in healthy criticism, wider views, new fields of research, and greater activity on the part of those interested in this particular field.

C. H. Lavinder, M. D.

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American Public Health Association

PREVENTIVE PRINCIPLES IN THE FIELD OF MENTAL MEDICINE*

By WILLIAM A. WHITE, M. D.
Washington, D. C.

The field of mental medicine, which by the way, is much broader than that implied by the term insanity, with which it is ordinarliy supposed to be coextensive, is generally presumed to offer little either as a result of treatment or prophylaxis. It will be my object in the few words to which the temporal limitation of my paper confines me, to try and dispel this impression—to bring a message of hope.

There are many causative factors that may operate to unbalance the mind. In fact, there are but few cases that come to us but owe their condition to several rather than to one cause. Many of these causes are familiar and well recognized. Of such causes as the infectious diseases such as typhoid, yellow fever, malaria, smallpox, diphtheria, I need not speak before this body. The work that you are doing in controlling infections of this character naturally controls also the mental sequelae that are not infrequent. I may say in passing, however, that important as is the problem of tuberculosis, and little as I would desire to minimize that importance, still I am of the opinion that the two venereal diseases, syphilis and gonorrhoea, produce quite as much suffering and I am sure that the former alone produces much more insanity, directly at least, than tuberculosis, and further, while the tendency of tuberculosis is, to a considerable extent at least, to weed out the unfit, here is a disease the distribution of which is controlled by accident and so it takes from us only too often the most useful and efficient members of the community, while the latter disease sterilizes many a woman who would make a good mother.

The venereal diseases, particularly syphilis, are of extreme importance in the causation of insanity and come directly within your province as public health officials. Of equal importance, though having directly sociologic as well as medical bearings, is alcohol. Alcohol and syphilis taken together are generally regarded as being responsible for twenty-five per cent of the insane. Although at first sight this statement is alarming on second thought it is reassuring because both of these causes are strictly preventable.†

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* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.
† Salmon, Thomas W., M. D.: Two Preventable Causes of Insanity. Pop. Sci. Mon., June, 1910.

However, it is not my intention to burden you with matter of this sort but rather to call to your attention some opportunities for the utilization of preventive principles which are less obvious.

These preventive principles have to do with those mental disorders that are not primarily dependent upon physical disease. There are a host of such disorders that are dependent to a greater or less extent upon purely psychological factors—mental causes. The individual at some point or other comes into conflict with the conditions about him, in which he must live, and to which he must adapt, if he is to proceed in life with anything like efficiency, and he fails to make the necessary adjustment. He is unable, for example, to reach a condition of emotional calm after the loss by death of a dear friend or relative, or after a disappointment in love; he cannot get on his feet again after being ruined by a trusted employe; he is placed in a position of too great complexity for a limited mental equipment and can not produce results that are up to reasonable expectations. At these periods of conflict failure is not infrequently expressed by the development of a psychosis. Failures of this sort, the inability of the individual to square up with the events of every day life, upon analysis are found to depend largely upon faulty and erroneous view points, upon vicious habits of thought, upon narrow and inadequate ideals, false notions and ambitions, in short upon a biased mental attitude towards the world of things and events.

Here are a series of conditions which strike you immediately as due in the larger sense to bad education, and in fact they are. The conflicts which arise, arise in large part because the mind has been so constituted by previous experience as to make conflicts out of certain kinds of circumstances rather than to adjust peaceably. Take, for example, the man who is always criticizing everyone about him; this thing and that are wrong, his superior in rank should have done thus and so, he would have done differently, etc., etc. That man makes the greatest amount of trouble for himself; he positively insists upon being unhappy. Instead of accepting conditions which he cannot change and making the best of them he frets and chafes under them, he actually looks for things with which to find fault, he positively will not be content in the sense in which contentment is desirable. Such a man is inviting disaster by using up his energies in a useless thrashing about, usually without the corrective of that satisfaction which comes from things accomplished. The young woman, of a distinctly different type, who develops a hysteria as a result of a disappointment has actually succumbed to a psychosis because of her failure to accept—to adjust. Instances might be indefinitely multiplied but the

fact I mean to bring out is that numerous psychoses are dependent upon mental causes which in their nature are removable or preventable, and subsequent attacks after recovery are alike produced in the same way.

People such as these, who present characteristics unfitting them for a peaceful adjustment to the difficulties of everyday life owe their defects to faults of education, by which term I include all that life of experience which is addressed directly or indirectly to the preparation for the independent life of adulthood.

The places where this education is for the most part acquired are two—the school-room and the home. Let us speak for a moment first of the home. The fundamental fact here is that the important groundwork of later life is laid much earlier than is ordinarily supposed, perhaps in the first four or five years of life, and this is the period in which no one will question that the mother's influence is supreme. Home conditions during this period are therefore most vitally important for the future. I will not mention the obvious effects of sickness, crime, alcoholism, all of which go to make a sordid, wretched place for the child to grow up in, but call your attention to two matters of importance: child labor and employment of women. We cannot expect much of the generation, the children of which were brought up in the mines and factories. Child life that is deflected into hard labor and unsanitary health-destroying surroundings when it should be unfolding and developing character in school, home, and play must become deformed and stunted.

Tense industrial conditions have gone even further than placing the child at labor. The mother, too, has found her way in large numbers into the factories so that again the child is robbed of its own, and not only he but the generations to come must pay the toll of this greed of gold.

It has been shown that hard work by the pregnant woman tends to bring about miscarriages or if the child is born at term, to result in a poorly, undeveloped child. The energy which should have gone to the growing child has been deflected to the loom. Children born under such conditions must of necessity be seriously handicapped; they must find the difficulties of life often too great; so what wonder that later they break down, become insane, paupers, criminals, it matters not for all these are evidences primarily of mental defect, mental insufficiency, inability to meet life's problems. I am in hearty sympathy with laws governing child labor and the employment of women. The laws governing the employment of women that are in existence in most of the European countries seem to be well conceived. They provide for a certain number of weeks, both before and after confinement, free from labor with the salary continued. They are a healthy reaction against the too great individ-

ualism of the present day and an acknowledgment that we owe something to those others in whose society we live, and from which we derive so much. The day is past when the individual will be conceived to have the right to ruin as many souls and bodies as he wishes and then toss them ruthlessly aside on the dump heap of public charity for this and succeeding generations to care for.

Apropos of this question of the child and the home Miss Dorr* in a recent magazine article has emphasized the present condition of affairs by calling attention to the lack of provision for the child in the modern city. There is literally no place for him. There is no ground for play and many apartment houses even refuse families with children. Then again the conditions that used to maintain in the home have changed. In the old days the child not only could run wild in the woods but he was early initiated into some form of wholesome kraft work. Now it is the immense factory, and if the family be poor, both child and mother work there, while if they be rich or well to do, the child slowly becomes an artificial product of civilization with all the animal trained out of him, and neither he nor the mother have any from of wholesome physical occupation.

A great deal is said about the strenuous life of the present day as a cause of neurasthenia but my experience is that more people become nervous because they have nothing to do then because they have too much. The man is relatively well off and he may always have work to do, but for the middle class and well to do women there seems very little. Everything she needs can be supplied better and usually cheaper than she can produce it. With practically nothing to do, with time hanging heavily upon her hands, she ekes out a miserable existence of dreams that don't come true, of ambitions unrealized, of lack of fulfillment—in short, of failure. These are the potential neurasthenics and it is against this hopeless, useless existence that so many of our women have to lead that the so-called Suffragette Movement is to my mind a healthy reaction.

At this point I cannot fail to mention that recent development of the desire for race betterment—sterilization of the criminal. It is very hard to find any justification for such legislation unless it be the good intention back of it and you and I all know the fate of so many good intentions. The only basis on which I can conceive that such legislation might be founded is on that of the theory of unit segregation and gametic purity as set forth by followers of the Mendelian hypothesis. I have never heard the suggestion of any such reason, but even so, this theory has already been vigorously attacked, and there seems little warrant for such applications of hereditary principles except newspaper pseudo-science.

* Dorr, Rheta Childe: A Fighting Chance for the City Child. Hampton's Magazine, August (?), 1910.

The whole question of heredity is altogether too vague in its application to man to warrant any such radical measures. Perhaps the matter of heredity might be summed up best in the characteristic chapter heading of Ellen Key* in her admirable book "The Century of the Child" as "the right of the child to choose its parents." This is not a witticism but involves a fundamental privilege which is rarely consulted. How frequently in this super-sensitive civilization of ours are the rights of the next generation given consideration? How often is the bringing of a new soul into the world given as much consideration as the canary, or the selection of a suitable paper for the dining room? Why, we are not even permitted to talk of such things. A salacious prudery which fills columns of the public press with the description of the seduction of a young girl, insists upon a becoming modesty in such matters that relegates the question of human breeding to the back-ground, and places its morality in the cat and dog class.

It is well to keep in mind that the symptoms of that group of mental disorders comprised under the general term insanity are acquirements. Whatever potentialities the germ may have had these symptoms have been added to them and not developed as an innate necessity, at least in the special form they assume. The full possibilities of the influence of environment are only beginning to be appreciated. If a change in environment will actually change the shape of the skull, in one generation, as has been recently shown by Prof. Boas, what may we not expect from hygienic surroundings and proper educational methods?

But to revert to the question of education. Many of the psychoses that later go to the making of the classes of chronic insane, criminals, paupers, prostitutes, tramps, and ne'er-do-wells generally, begin early in life. They have their incipiency in the school-room and in the factory, they develop often under the very eyes of the teachers and, too, of the school and factory physicians. Our studies lead us to believe more and more that these psychoses are to a large extent preventable, yet they are only recognized when in full bloom and at a time when the possibility of applying preventive principles has long since past. They are not seen when in the making.

The reason for this failure to see the obvious is because of lack of training of teachers and physicians in what to look for. We see what we have learned to look for; few of us see anything else.

To say nothing of the pedagogic aspects of this state of affairs and the training of teachers, we may well inquire into the reasons for the neglect of psychiatry by our medical colleges. It is true that in the past few

* Key, Ellen: The Century of the Child. G. P. Putnam's Sons, New York and London, 1909.

years most of the medical colleges have added a course on mental medicine to their curriculum, but it usually consists only of a few didactic lectures, and almost always is considered as a sort of extra subject dealing with a department of medicine that the average practitioner will have little to do with. While interminable amounts of time are spent in discussing the appendix or the gall-bladder, the mind is almost totally neglected, and yet after all the object of life is a contented, peaceful mind—in short, happiness—to which the body is only secondary. The patient who consults a doctor does so because he is in pain, worried, unhappy, and yet pain, worry, and unhappiness are mental facts. What he really wants is peace of mind, to which the doctor contributes by making well again a sick body without, as a rule, appearing to realize that a mind has been involved at any point in the proceeding. How much we hear in our medical schools of pathology and how little do we ever hear of mental hygiene— of what Seneca has called the "business of a happy life." In this respect our medical courses are open somewhat to the same criticism as the miser. They fix their attention too much upon the means to happiness and in doing so often miss the goal by not using those means to purchase the desired thing.

In all preparations for life there is no suggestion that there is anything to be learned about self-knowledge, self-mastery; no suggestion that there is any light to be shed upon the problems that arise within one's self, that it is possible to direct the forces of our inner conflicts. We are not taught how to curb the hot bursts of passion by passing them in review under the scrutiny of the intellect, nor how to compensate for the sorrows of life by their sublimation through newly awakened interests. All these things are left to mere chance. We know much of the efficiency of engines under various loads, and thought and money unlimited have been spent upon making the necessary adjustments. But to the development of efficient mental mechanisms to meet the loads of adversity we devote hardly a passing thought.

Incipient mental cases in the community could be reached if a regular dispensary service were established as in other departments of medicine. Each municipal hospital should have its psychopathic ward to which patients could be admitted with no further preliminaries than are needed for admitting a patient to the general wards with, for example, a pneumonia or a broken leg. Each community should have also an after-care society for the purpose of caring for patients discharged from hospitals for the insane, and by helpful instruction and otherwise, attempt to establish them in the community, and prevent a recurrence of those conditions which before led to the mental break down.

A law was passed at the last session of the New York legislature that should interest all of us. It provides for taking out of the hands of the poor authorities the care of the insane previous to commitment, and putting it into the hands of the Health Officer. This is surely a step in the right direction. Not only are the insane cared for by the poor officers in many localities but quite as frequently by the police. I will not attempt at this time to dwell upon the abuses that have resulted as a consequence, but only emphasize the fact that the problem of insanity is a medical one from beginning to end and that it should be in the hands of medical men only. The segregation of an insane person should be considered as a quarantine measure and not dealt with from the standpoint of criminal law. When this is done, when the problem of insanity is definitely turned over to the medical profession, it will not be long before the value of preventive principles will be recognized and efforts made to put them in effect.

The practical things then that may be done at once in any community are these:

1. The securing of legislation that places the responsibility for the care of the insane previous to commitment in the local Health Office.

2. Every city of 100,000 inhabitants or over, should have a psychopathic ward connected with its municipal hospital which is as accessible for the mental case as the other wards are for general medical and surgical cases. This ward should have an out-patient department.

3. The organization of an after care society to assist persons who have been discharged from a hospital for the insane to get on their feet and to point out to them ways of avoiding the conditions which led to their breakdown.

4. The passage of adequate laws for the control of the labor of women and children.

5. Popular education. By the use of this term I am not merely dealing in a glittering generality that may mean nothing or everything. We have in this country nearly two hundred State Hospitals for the care of the Insane. These hospitals, each one of them, should be a center of information for the community in which it exists and its medical officers should use their positions to spread information about mental disorders. The Superintendent, or a member of the staff, should deliver one or more popular lectures each winter to which the public are invited. Much might be accomplished in this way if all hospitals would do this.

6. Field work from the State Hospitals and Psychopathic wards as centers to study conditions under which insanity has developed, to furnish assistance to the hospital in dealing with its patients, and to co-operate with the after-care society.

7. More liberal support by City and State, of scientific research work in this field especially along the lines of etiology and prophylaxis.

In this connection it may interest you to know that in 1906 there was organized at Milan an International Committee for the study of the causes and the prophylaxis of mental disorders. It is the object of this Committee to form an International Institute for the study of the causes and prophylaxis of mental disorders, and the King of Italy has consented to become the patron of this Institute. Nineteen countries sent official delegates to this Committee but as yet no one of them has made any appropriation to enable the work of the Committee to be carried forward.

The possibilities of the application of preventive principles in mental medicine are as broad as the multiplicity of human activities, as deep as the human soul. It has its medical, sociological, economic, legislative, pedagogic, and humanistic aspects. Of prime importance, however, is the recognition of the problem and to this end no one thing is more important, to my mind, than the inclusion in our medical curricula of a course in mental medicine that shall not be an unimportant secondary affair, but shall be on a par in extent and importance at least with the course in practice.

Twenty-five years ago a claim for the exaltation of mental medicine to a position of such importance might well have been criticized as unwarranted, but since then no department of medicine has advanced more rapidly or attracted a relatively larger number of able students. The advances in this field and the cognate subjects fully warrant such a claim. There is now such a mass of well established data in general psychology, child psychology, pedagogy, psychopathology, and the anatomy and physiology of the central nervous organs as to make it quite impossible much longer to resist the claim of mental medicine to its proper place in the medical curriculum and when that time comes the mind will be in a fair way to attract as much attention from the devotees of public health as does now the subject of infectious diseases. We will have learned that a healthy body is of no use to the individual or to society unless there dwells within a healthy mind. The maxim: "*Mens sana in corpore sano*," will still be true but in a sense amplified and vitalized.

Governmental Hospital for the Insane.

THE PREVENTION OF FEEBLE-MINDEDNESS.*

By E. R. JOHNSTONE,
The Training School,
Vineland, N. J.

Under the gerneal heading "The Prevention of Mental Defects and Mental Diseases," the Secretary wrote me that my title would be "Imbecility."

I should like to change this word to "Feeble-mindedness." The desire for euphemism has within the past hundred years changed the generic term for people of this class from Idiot to Imbecile and from Imbecile to Feeble-minded.

Within the decade many of the institutions have divided their inmates into idiots (lowest), imbeciles (middle), and feeble-minded (highest), but this has led to a confusion of the specific and generic meanings of the word feeble-minded.

At the last meeting of the "American Association for the Study of the Feeble-minded," it tentatively agreed that the entire group should be known as the Feeble-minded. In the lowest grade is the Idiot, whose mental development will probably never exceed that of the normal child of about two years. In the middle grade is the Imbecile, whose mental development will probably never exceed that of the normal child of about seven years. In the highest grade is the Moron, (Webster's definition of a fool), whose mental development will probably never exceed that of the normal child of about twelve years.

"The terms already in use to express pathological and other definite characteristics such as hydrocephalic, mongolian, etc., may be used as prefixes or adjectives." I am using the term feeble-mindedness (imbecility on your program) in the generic sense.

One of the great problems of the last one hundred years has been to find the cause or causes of feeble-mindedness and the various writers have offered one reason or another, frequently giving percentages. So we have among the causes said to act:

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

a. Before birth:

   Heredity.
   Tuberculous conditions.
   Consanguinity of parents.
   Alcoholism.
   Youth or old age of parents.
   Fright or shock to mother.
   Mal-nutrition of mother.
   Exhaustion of mother from child bearing.
   Developmental—those coming to the surface in early childhood.

b. Those that are said to act at the time of birth:

   Prolonged parturition.
   Accident.
   Premature birth.
   Primo-geniture.

c. Those that are said to act after birth:

   Traumatic cases.
   Inflammatory diseases.
   Toxic conditions.
   Social conditions.

For many years we have been growing more and more suspicious of specific figures. That any or all of the above conditions may affect the case is undoubtedly true, but careful and detailed study of cases shows that in many instances it is impossible to tell whether the condition has induced feeble-mindedness or feeble-mindedness has induced the condition.

The English Commission after five years of investigation of the whole problem concluded that the first case in a family is sporadic but added—and this is the important fact—that once it appears it is easily passed from generation to generation.

I believe it is safe to stand with those students who speak of the insane, epileptic and feeble-minded; many of the tuberculous and alcoholic; the congenitally blind and deaf; some of the kleptomaniacs, recidivists, prostitutes, and sex perverts; a few of the tramps and paupers and particularly the semi-responsible mothers of illegitimate children; as belonging to a great neuropathic family who, themselves degenerates, bring into the world other degenerates.

As we study the history of the families of the children in our institution we find these neuropathic conditions occurring again and again, and throughout it all the conviction is borne in that heredity must claim by far the largest part of our attention if we are to check the stream of the feeble-minded which is undoubtedly growing from year to year.

Every effort must be made to prevent these conditions which tend to weaken the stock or make even a good environment useless. Alcoholics, syphilitics and tuberculous people should not attempt procreation. Troubles of sight and hearing should be corrected in so far as possible. The obstetrician should measure the pelvic outlet so as to be prepared for trouble if it is due to come. The environment must be the best possible but the real point of attack is the feeble-minded person who would become a parent.

Fourteen years ago Bicknell investigated 248 families, finding 887 persons of whom 63.2 per cent were feeble-minded. In 101 of these families feeble-mindedness was found in more than one generation.

Eight years ago Butler gives 803 families with 3048 members; of these 1594 or 52.3 per cent are feeble-minded and 38.3 percent are normal or unknown. Probably 52.3 per cent of the unknown ones are also feeble-minded.

In May of this year we compiled the statistics of the families of 77 of our pupils. These families were studied intensively—our field officers seeing personally practically all of the individuals reported.

In 6	families where the father only was	feeble-minded there are	41	feeble-minded
" 15	" " "	mother " " " " " "	144	"
" 8	" " "	both are " " " "	77	"
" 48	" " "	neither are " " " "	90	"
Total 77	"		352	"

Among the relatives of these 77 children (including the parents) there are families with feeble-minded children as follows:

Father is feeble-minded, 14; mother feeble-minded 32; both feeble-minded, 16; neither feeble-minded, 51.

The 14	families where father only	is feeble-minded have only	40%	normal.
" 32	" "	mother " " " "	17.5%	"
" 16	" "	both are " " "	0%	"
" 51	" "	neither are " " "	56%	"

In 113 families having realtives in our school, numbering 495 members we are only able to find 177 or 35.8% apparently normal.

I wish to cite briefly a few families:

I. Maternal grandparents both feeble-minded with two feeble-minded daughters. No. 1 married a feeble-minded man. They have three feeble-minded children. She had an illegitimate son who is feeble-minded and criminal. Only one of this family in custody.

II. Grandmother feeble-minded. Her husband alcoholic, none of the children feeble-minded, although two had St. Vitus dance, one had hysteria

and one was alcoholic. Her daughter (mother of our child) married a normal (?) alcoholic man and they have three feeble-minded, two stillborn, two miscarriages and two normals. The second and third daughters also have feeble-minded children. Only one of this family in custody.

III. Five feeble-minded children of this family are in our school. We supposed they were of three different families until our field officers investigated them. The father (alcoholic) of three of these, married for his third wife a feeble-minded prostitute with five feeble-minded brothers and sisters. She had had three feeble-minded children of whom he is supposed to be the father. After marriage they had three children all feeble-minded. This father deserted this third wife, married an alcoholic prostitute and is the father of still another feeble-minded child by a fifth woman who is feeble minded.

One more family. The oldest child is in our school. She has eight feeble-minded brothers and sisters. Her mother had children by four men, two of them feeble-minded. The mother's five brothers and sisters are all feeble-minded. Both of her parents were feeble-minded and her father had nineteen feeble-minded brothers and sisters. This father and grandfather were both feeble-minded. Five generations with this defect. 319 members traced and 119 of them feeble-minded, 42 normal and no data on 158. Plenty of alcoholism, syphilis, tuberculosis and crime. The study is not yet completed. Only one of the whole family in custody.

How shall we prevent feeble-mindedness? Let us stop speculating and gather facts.

In New Jersey, the Training School at Vineland has begun by putting at work four field officers* who, beginning with the child in the institution, go directly to the families, taking the latest news of the child. They go in a friendly spirit and ask all sorts of questions. They are frank and open about it and have been received with a cordiality that has amazed us. They ask about seeing other relatives but are more frequently referred to them. They see every case possible and they get results.

We are testing the whole plan out so if you have no institution in your state from which to start, try this plan which we are working successfully.

We have in our state a special committee which appointed itself. Then it got the State Charities Aid Association and the Commissioner of Charities to appoint it. It is called the Committee on Provision for the Feeble-minded and Epileptics.

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* Since this paper was written the State Reformatory, the State Institution for Feeble-minded Women and the State Village for Epileptics have each put a field officer on their family histories.

If you have no Board of Charities or Charities Aid get any society that will work to appoint one; preferably your State Medical Association.

We are asking every physician in our state for names and addresses of all feeble-minded and epileptics of whom they know. After we get through with them we'll ask the clergymen, then the school superintendents and then the lawyers. Fifty per cent of the doctors are replying with names. This should give us a pretty fair census.

You can start with the almshouse superintendents, the poor masters and the heads of the Institutions for the Insane or Incorrigibles. Get your field officers looking up their cases and you'll have arguments strong enough to move any legislature to appropriate money for institutions. We have three, a State Home for Feeble-minded Women, 200 inmates, a village for epileptics and feeble-minded men, 400 inmates; and a training school for feeble-minded children, 400 inmates.

In twenty-two years, $350,806 was appropriated for buildings and furnishings for the first two. (The third is a public charity, not belonging to the State.) This last year—since this committee has been at work $211,000 was appropriated and we've just begun. But remember the people want facts—not guesses. As soon as parents find that there is a possibility of having their children properly cared for and trained there will be many applications for admission to such an Institution.

The Committee is sending out 5,000 copies of the following report:

REPORT OF THE COMMITTEE.

The Committee began its work early in January, 1910, by sending to the parents or guardians of all of those applying for admission to the State Home for Feeble-minded Women, the Training School for Feeble-minded Girls and Boys, and the State Village for Epileptics, a letter requesting the names of all who were interested in the applicants.

Instead of merely sending us a list of names, most of the parents went personally and requested signatures, and in this way a real co-operation was secured with over 1200 business and professional men and women from all parts of the State.

Letters explaining the purpose of the committee, and the best way to assist were sent to all of these interested persons, and a great many of them replied telling what they had done. Their letters showed a real appreciation of the needs of the defectives and a desire to further their interests in every reasonable way.

Letters were sent to each member of the legislature explaining the condition in his county; and a table showing the number of applicants,

the number on the waiting lists, and the number eligible for transfer, by counties, was also sent. (Feeble-minded children are transferred at the age of 21 to the institutions for adults.)

A brief statement of the whole problem was sent to every newspaper in the State. Many of them published this statement, and some made favorable editorial comment.

The results are shown by the appropriation bills. For the State Home for Feeble-minded Women, the Supplemental Bill provides, in addition to other necessary things:

$1,000 for beds and bedding.
$3,000 for inside repairs, etc.
$5,000 for additional maintenance.

This will enable the State home to change some rooms, and provide for about forty-three women just as soon as the repairs can be made. This money is available at once. In the Regular Bill there is an appropriation of $50,000 for a new building. This sum will be available after November 1, 1910, and will provide a much needed hospital ward in the new building and living quarters for about forty women.

Feeble-minded women are now awaiting admission to the State Home as follows:

From the Training School	52
From the State Home for Girls	38
From various counties	22
	112

All of these cannot be taken at once, but plans for their reception are now under way, and it is expected that the forty-three most urgent cases will be admitted before the summer is over.

In the Supplemental Bill the Epileptic Village received no money which can be used to provide more room for patients, but in the Regular Bill, which is available November 1, 1910, they received:

For two buildings for epileptic patients	$60,000
For one building for feeble-minded men	45,000

Work on these buildings will begin as soon as possible after the money becomes available, but it is doubtful whether they can be ready for occupancy before the fall of 1911. A supplemental appropriation for maintenance must therefore be asked in March, 1911, so as to provide for these cases immediately upon the completion of these buildings. If

the plans and specifications are all ready by November 1, 1910, when this money is available, this work may be commenced promptly with the opening of Spring.

Special mention should be made in this report of the hearty co-operation of every member of the legislature in securing these appropriations, and particularly of the wise and considerate action of the members of the Appropriation Committee. For twenty-two years there has been provision made for an average increase of only twenty defectives per year. This legislature has provided for about 200.

The committee cannot speak too highly of the co-operation of those interested in the various applicants. They wrote letters to the members of the legislature and saw many of them personally, in some cases even bringing the needy child for personal observation, so that our law makers were entirely familiar with the problem of the feeble-minded and epileptic, and the needs of the individual cases. The Appropriation Committee visited the three institutions and saw in detail just what was to be done.

New Jersey is to be congratulated upon the judgment displayed by its representatives in this advanced step toward providing for its defectives.

Money expended for furnishings and buildings at the State Home for Women and the Epileptic Village as follows: Since 1888, $350,806.43. This Year, $211,000.00.

As the Training School for Children is not a State Institution, it cannot receive appropriations for buildings, etc. It only receives a per capita allowance for the State children sent to it. But increased accommodation in the State Institutions for men and women provides room by permitting the children's institution to transfer its adults to the State Home for Women and the men's departments at the State Village.

For the Committee,

E. R. Johnstone, Secretary.

A few legislators objected to the parents taking feeble-minded and epileptic children into their offices and homes, especially when the epileptics had spasms there, but at least it accomplished results.

Perhaps you feel that I have not told you how to prevent feeble-mindedness. A few people say, put the ones we have painlessly to death. Of course civilized people will not agree to this. Two or three states have passed laws authorizing the unsexing of certain degenerates "after they get in institutions," but note—they have to get in the institutions first.

I heartily approve of the operation of castration and oophorectomy and merely agree to vasectomy and salpingectomy for want of something better, for after these operations have been performed a fair percentage of the cases may be returned with safety to their homes and thus make room for others in the institutions; but the ideal way is to gather all of the feeble-minded into institutions, and train them in so far as possible to be self supporting. Give plenty of industrial occupation and very little academic training. Thirty to fifty per cent can be made entirely self-supporting after ten years' training.

Take the women of child bearing age first and teach them to raise and can small fruits, raise poultry and garden truck, knit underwear, weave rugs, carpets, etc. Then take the others as young as possible and the economic problem comes close to solution.

But don't talk—get to work. The numbers are increasing. If you don't care for them in well conducted Training Schools where they may learn to contribute toward their own support you must keep them in almshouses, reformatories, prisons and other institutions and when they are led into evil ways you pay for their arrest, their trial and the damage they have done.

If feeble-mindedness is to be checked you personally must DO something.

DISCUSSION

Dr. John N. Hurty, Indianapolis, Indiana. Here it seems to me is the keynote of the whole subject of hygiene: What if we do save a child from diphtheria or scarlet fever and yet fail to save it from some neurosis? The child is lost just the same. It would be better for it to have died than to have saved it. What are these societies for? For the preservation of the child and the study of the child. The longer I live and work in hygiene the more I believe that among the children is the place to work. There is little hope to work with the adult. We must go back and study the child, we must instruct the child. We must make the child a good animal. That is what Herbert Spencer said. That being done, we have taken the first step. Under our present form of education we do not do this except to a limited degree, but it is gradually penetrating our minds that the child must be medically inspected, must have playgrounds and abundant fresh air. We have been shutting out the air from the school room and calling it economy. We have been buying sites for school houses without playgrounds and calling that economy, and it is the worst kind of extravagance. How do these economies and conservations impress the average business man? The business man is in the saddle. It is the business man who rules. He is our king. How can we get him to understand it is not economy to fail to provide children with playgrounds, to fail to provide medical inspection, to fail to do these things at the right time which are necessary to prevent disease and the neuroses? It is true that an eloquent orator can go before any legislature and make a plea for the poor insane, for men and women who have lost their minds. These people are deserving of pity and compassion. As the result of these appeals, the legislators will vote large sums for insane asylums. The State of Indiana has five insane asylums, the last having been built a short time ago, the cost exceeding a million dollars. Think of it—and now we have to build a sixth asylum! The business men should be made to understand that preventive medicine does prevent, and if you want to know how hard it is to impress upon the average business man the fact that prevention is better than cure, go before a business organization and read a paper like that which Dr. White has presented here, and I will venture to say that you will not make very much of an impression. And why? Because the business men are generally, though not always, impressed with the idea that they are the whole thing and that the medical man, especially the health man, is more or less of a crank. In my state,

Indiana, in making a plea for the inspection of school children, I said, "Let us have the teeth of the children fixed so that they can eat, and be properly nourished. Let us remove their adenoids so that they can breathe freely and develop properly." For proposing this, newspaper men and business men, have denominated me a crank, and they call us all cranks for proposing these economic, rational, business-like and scientific measures.

It has been said that we are engaged in the greatest work that is possible, but do the business men so understand it? No, they do not. They do not attend these meetings. They do not hear; they do not listen. I once visited a rich and influential business man and asked him to help in the fight against tuberculosis. A contribution was requested and he was urged to join the tuberculosis society, so that it could be said that they had practical business men engaged in this work. He replied "No, I cannot join the tuberculosis society. Individual effort does not appeal to me, but I will give you a contribution." That, of course, was a good act in itself, but he would not join the society himself. In three years from that time his daughter died from tuberculosis. During that period he had a chance to study tuberculosis and to know that it was a preventable disease. He understood it as never before. He called at my office two months after her death and said, "Do you remember when you came to me and asked me to help you in the cause of tuberculosis ? I told you I did not have time to help in this work. My daughter is now dead from tuberculosis and I have an abundance of time to work in this cause." See how we are constituted. It was necessary for death, for disaster, for sorrow, to come into his life before that man could take up this work. We cannot get men to look at this matter in the right light and take hold of this work with us. We must make them understand that we must do something to prevent this eternal building of insane asylums. If any of you wish to go into philanthropy, if you wish to do something for the American people, if you wish to improve business, do something for the little children.

Dr. Norden, of Sturgeon Bay, Wisconsin. Aside from trying to make a living in the practice of medicine, I have been riding a hobby—the education of children. There is one feature which has struck me rather forcibly, and that is the neurotic conditions of children that are superinduced by night studies. For this we should not blame the teachers, nor should we blame the school boards. I am a member of a school board myself, and know their troubles. We should blame the people who prevent the school board from doing what they should do. It is absolutely necessary, the way education is carried on these days, that the child must study at

night or he must sacrifice the play-time of the day. It is almost impossible for most children to study in school while one section of the school room is reciting. I have suggested frequently in my work that we cut down the number of hours of school sessions. If we use the school session for the recitations and explanations only, and allow the rest of the day to be used partly for pleasure and partly for study, it would be a good thing. In this way we cut down the period of confinement and also give the child plenty of time to study during daylight. We thus prevent neurotic conditions that are produced by night studies. I merely offer this as a suggestion. It may be a new thought to some of you and I hope you will take it home with you and discuss it more fully at the next meeting.

Dr. Hughes. The attitude of the average business man toward public health affairs is one of indifference, to say nothing of his ignorance on the subject. Business men are beginning to understand the value of saving by-products. In the coal tar business, look at the number of by-products saved. Take the raising of cotton and see how the cotton seeds are made into meal and oil. Mr. Cooper, the great New York philanthropist, made an immense fortune by taking the refuse of boneyards and converting it into glue. We should not allow people to become broken down with neuroses, with mental aberrations, dementia, idiocy, imbecility and other consequences of neurotic degeneration, because when they are thus broken down they are thrown into the scrap heap and ash piles of human action where they are forgotten.

We have lunatic asylums and places for idiotic and other forms of mental derangement. People do not try to save themselves so much as they ought from developing these neuroses, but they learn to save the scraps in their businesses. This is the indictment I bring against the average business man; namely his indifference and the fact that he neglects to save his own kind, not only after they become neurally broken down, but he neglects to save them by providing those means which an enlightened profession has pointed out for generations as the method by which human organic neurotic salvation, to say nothing of spiritual improvement, may be accomplished. Some of them listen to prayers and to preachers on spiritual salvation, overlooking and neglecting sanitary salvation. We plead for brain and mind and nervous system salvation of humanity. Salvation, like the waters of life, may be drunk freely in the light of our modern gospel of health. Whosoever will may have sanitary salvation for his offspring if he will take the matter under proper consideration and choose the right parentage and grand-parentage for the child to be conceived and born. Lunatic asylums, asylums for idiots, homes for the

feeble-minded and the deaf and dumb, are monuments largely to the error of unhealthy selection. We will obliterate them when we shall have wisely and physiologically obliterated the causes of human degeneracy by sane and sound mental selection of the progenitors of the generations.

Dr. A. C. Rogers, Faribault, Minn. Dr. Johnstone has presented some startling facts concerning some sources of supply for the New Jersey Institutions for Feeble-Minded and Epileptics. What is true of his state is very generally true of every commonwealth. There are two sources from which defective children spring: First, good families, free so far as appears from any pronounced blood taint. These sporadic cases, it is fair to presume, will always be found, unless biology shall finally discover where the error lies and teach the remedy. Second, families in which are pronounced defective or neurotic strains. It is from these latter that a very large number of the inmates of institutions for feeble-minded and epileptics, many cases in hospitals for insane, as well as a good percentage of the inmates of our reformatories and penal institutions, are derived.

The attitude of the nineteenth century has been one of solicitude for the care and betterment of the individuals of these classes. The twentieth century will mark a growing demand for prevention. Human life, however, is too complex a matter, the modus operandi of its genesis too completely shrouded in mystery, to promise rapid and certain revelations sufficient to insure the universal production of perfectly mental and moral human beings at any time in the near future. There are, however, a few guide boards along the way that, heeded, will lead toward the desired goal. Just at the present time we need facts, perhaps, more than anything else—that is, facts concerning the family history of definite concrete cases with their places in their respective families. The investigation should be broad in its scope, not limited to an occasional family, but including any family in which two or more defective or delinquent members are found. This work could be done upon the initiative of state institutions by an enlargement of their functions or by the creation of a commission of capable men (or men and women). In either case the first need is ample facilities for field work by well trained, capable, patient and tactful agents. The next requirement is a careful classification and analysis of results to bring out the relationship of the various forms of mental defect and delinquency to the neuroses, and the location of the most vicious blood strains. With this information the subject of prevention can be taken up with more hope of reaching some valuable practical conclusions.

SANITATION OF BAKERIES AND RESTAURANT KITCHENS.

By CHAS. B. BALL,
Chicago, Ill.

The anti-tuberculosis propaganda which has characterized the beginning of the twentieth century has produced in the mind of the public at large some consciousness of the evils attendant upon a lack of light and ventilation in living rooms and workshops and has directed attention incidentally to the disadvantages of underground stores and habitations. Notwithstanding these results of the campaign against the "Great White Plague," the conversion of existing cellars and basements into underground stores and shops, and the location of various business undertakings in basements of new buildings is still going on in all the large cities without any organized attempt on the part of health officers to stem this tide of cellar occupation. The experience of three years past in Chicago justifies the conclusion that an initial effort may well be directed against cellar bakeries and restaurant kitchens. The awakening of a desire for clean food, which has been manifested in federal and state legislation, affords in every community a sound basis for vigorous attempts to restrict the establishment of new underground installations of this character and to effect the closing of the worst of those now existing in cellars.

The principal motive for such a movement is not, however, the desirable end of increased purity of the food products of bakeshop and kitchens, but rather the protection of the health and lives of the "slaves of civilization" who are condemned to labor under insanitary conditions comparable only to such as prevail in the holds of ships.

We shall first discuss the baker and the bakery, and later consider some application of the principles laid down to underground kitchens.

From the time (1670) when Ramazzini wrote on the diseases of bakers and evils of night work, and pointed out the high mortality of bakers in cities, a long line of Continental and English investigators have agreed that the occupation of the baker predisposes to acute rheumatism, stomach disorders and diseases of the respiratory system. Those authorities are fully set forth by Dr. Frederick L. Hoffman* in a monograph on "Mortality from Consumption in Certain Occupations," and need not be noted in detail here. Referring to the studies by Dr. Zadek of Berlin in 1896,

* Bulletin of the Bureau of Labor, No. 82, May, 1909, pages 518–537.

Hoffman says: "A wealth of statistical data derived from various sources is considered in the discussion, all of which may be summed up in the statement that the evidence is entirely conclusive that the occupation of baker, unless subject to strict sanitary supervision, is decidedly prejudicial to health."

In considering the incomplete data available for the United States, especially the mortality among bakers and confectioners reported from the registration states for 1900, he asserts that "The general conclusions of foreign authorities are, however, strictly applicable to American conditions, and they may be summarized in the statement that the continuous and considerable inhalation of flour dust is injurious to health and a predisposing factor in the mortality from consumption and from respiratory diseases generally." He pleads for "a further and more thorough investigation into the mortality of this occupation as a most valuable contribution to industrial hygiene."

All investigators of this subject unite in attributing a baneful influence to the cellar locations occupied by bakeshops. The proportion of underground shops has always been large, especially in cities. In Chicago, in 1907, the number was 582, constituting 43% of all establishments. In a large majority of these the air was foul, the lighting bad, the floors and walls dirty and the plumbing fixtures ill-kept.

From our experience in dealing with these unfit locations, 282 of which have been discontinued in compliance with orders from the Department, we are moved to note the disadvantages incident to underground bakeries, especially to such as are in cellars having a ceiling at about the level of the ground, as follows:

1. The lack of sufficient natural light is one handicap of the cellar bakery. Besides the frequent experience that a location depending solely upon artificial light is more than apt to be found dirty, the hygienic value of sunlight, even when diffused, in decreasing the viability of pathogenic bacteria, is well established. General Sternberg's statement that "sunlight is one of the most potent and one of the cheapest agents for the destruction of pathogenic bacteria," meets the approval of, and is expressed in almost the same language by Newman, Frankland, Rosenau and other writers on the subject. The late Prof. Charles Harrington, writing generally of the value of light in factories, remarks "Although good light may not be a necessary factor in all the various kinds of work, and poor light may not always lead to injury, the effect of well lighted rooms, if only to exert an unconscious influence upon the minds and spirits of the workers, is highly desirable as a concomitant factor in the maintenance of health." This well known stimulating effect of a sunshiny room upon the spirits of

the workmen is possibly lessened by the practice of operating bakeries at night. Such night operation will be greatly restricted, we believe, in the course of time, as it now is by law throughout the Kingdom of Italy.

2. A second disadvantage of the cellar bakery is the increased difficulty of adequate ventilation because of its location below the ground level. If the means of ventilation are natural ones only, depending upon air curremts through doors and windows, the location of these openings below the surrounding ground surfaces almost precludes any useful effect from them. As compared with like results of air flow by natural causes through similar openings above the ground, they are almost negligible. If mechanical means of ventilation are resorted to, the obstacles encountered in preventing the entrance of dust, etc., from the streets and alleys, are almost insurmountable, and can only be overcome by locating inlets above the ground or by providing expensive air cleaning apparatus.

3. In this connection may be noted the increased liability to contamination of bakery products both before and after passing through the oven, by the entrance of dust laden street air. Professor Harrington has well said that "a cellar is not a suitable place for handling dough, jellies, food, cream, etc., which go to make up food products, particularly on windy days in summer when the sidewalk windows permit ready entrance of street dust into the chocolate and cream fillings, the lemon and apple pies, as not infrequently has been observed." Although the danger of infection from dirt blowing from the outside into unbaked bread and pies may be less than that of infecting such food by contact with the floor after baking, it is none the less to be avoided as an undesirable factor of food production.

4. A substantial disadvantage of a cellar bakery, often overlooked and sometimes even misconstrued as an advantage, is the decreased radiation of heat through the lower walls of the building as compared with upper walls exposed to air currents. While the general fact that a cellar is cool in summer is unquestioned, it is also well ascertained that when the oven of a bakery is fired, the slight radiation of heat through the cellar walls and the surrounding ground with which the masonry is in contact results in abnormally high temperatures in the cellar room.

5. The underground bakery is likely to have insufficient and incomplete drainage on account of its location. In Chicago, flooded bakery floors have been common for years past and have resulted often in the making of food under disgusting conditions of filth. Coupled with inadequate drainage in a cellar, is the increased tendency to dampness with its consequent damaging effects on the flour and meal stored for use.

6. One of the serious dangers attendant upon cellar bakeshops is the increased danger from undiscovered fires which threatens the safety of persons living in upper stories of the same building. This evil has not in Chicago been emphasized as it has been in New York City, where large sums have been expended in providing fire resisting construction between bakeries in the cellar and living rooms in upper stories. This legislation does not allow any openings whatsoever to be maintained in the floor of the first story. While our Chicago situation doubtless requires attention from this point of view, the danger is less threatening on account of the fact that few of our buildings containing bakeries are over three stories high and most do not exceed two stories.

7. The entrance of rats and other vermin is encouraged by underground locations and their eradication rendered much more difficult than when the floor is at or above the surface.

Let us now proceed to note the five principal structural requirements which are indicated for bakeries hereafter established:

1. The floor should be at or above the ground level. Although there is not at the present time, so far as we are advised, any law which requires a bakery to be placed wholly above the ground, it appears that the considerations which have been urged against cellar bakeries will, in the near future, be held to be of sufficient weight to require this important advance as to location. As a practical matter of design, where a building is erected on a costly site, it is a prime requirement that the principal floor be on, or only slightly above, the level of the street. As soon as it is conceded that the floor of a new bakery shall not be more than five feet below the street (the requirement of the Wisconsin law and our Chicago ordinance), it will, in the more difficult cases, be brought at least to the height of the street grade.

A recent decision of the Supreme Court of Wisconsin in the case of Benz & Nakielski versus the State Bakery Inspector, is worth noting in this connection, not only on account of the strong terms in which it upholds the reasonableness of such a restriction applied to bakeries as that the floor shall not be more than five feet under ground, but as well on account of the broad ground taken with respect to the application of the police power; the court holding that "individual cases cannot determine the necessity of classification. The question is, whether in general the public health will be promoted by the rule and not whether isolated cases do not need such a rule. If the rule be in the interest of the public health, it must be general and well within the class controlled by it."

2. The lighting and ventilation should be effected by windows placed on at least three sides of the bakery. If a skylight be practicable, it may

replace windows on the third side, provided the windows which remain are in opposing walls of the room. Any less favorable plan will fail to secure adequate natural ventilation. Windows should open on spaces at least ten feet in width and should have their sills no nearer to the ground than four feet, a height sufficient to escape the entrance of most of the dirt blown about by the surface air currents. The tops of windows should be kept as close to the ceilings as convenience of design will permit.

3. The floors should be rat and moisture proof. There is little objection to the use of a hardwood wearing surface over a concrete floor structure, although the best types of monolithic floors are better than any wooden floor.

4. The best wall finish is hard and smooth cement plaster painted with enamel paint. Ceilings should be of the same material or may be sheathed with steel over a hard vermin-proof plastered surface. The use of whitewash for wall or ceiling coating is now recognized as undesirable since its surface is always rough, dust catching, and liable to flake.

5. An important feature consists in arranging all the furniture and equipment so that it may readily be moved away from the wall, or to a new floor location, when the surfaces are to be cleaned or repainted. Fixed wooden shelving, immovable troughs and tables, do not allow proper maintenance of walls and floors.

Passing now to the consideration of restaurant kitchens, particularly those situated in cellars, let us note that the administration of the restaurant control ordinance passed in July, 1906, was mainly concerned at the outset with the quality of the food supply. Our inspectors found rotten meat in the ice boxes, spoiled canned goods in the store rooms, rat runs in the vegetable bins and cockroaches everywhere. After a few months insistent action by the Department and consequent steady improvement in these conditions, attention was directed to structure and ventilation as well as maintenance. All the disadvantages observed in cellar bakeries were found commonly present in restaurant and hotel kitchens. Besides these were found the added evils of very cramped working spaces, clouds of steam from cooking and dishwashing operations, very high temperatures near the boilers and ranges and accumulations of garbage and trash in close proximity to the prepared food stuffs. Such defects in structure were found, as floors consisting of a number of layers of saturated boards, soot blackened paper hanging from walls and ceilings, wood tables and meat blocks with wide cracks containing decomposing grease deposits, cellar windows and vault openings through which street dust sifted into food ready for the table and toilets and locker rooms not properly shielded to afford protection to the food in preparation.

Our experience with these foul catacombs leads to the conclusion that new installations of restaurant kitchens, in addition to the provisions suggested for bakeshops, require attention to the following:

1. Ample space must be provided in which the employes may perform the various operations. The contingency of expansion at a future date should be considered, as the tendency to enlarge the dining room, without providing additional kitchen facilities, is found in a great many cases.

2. The arrangement of the various appliances in their relation to each other should insure the isolation of dishwashing and garbage storage from the handling of food.

3. Adequate provision must be made for the removal of cooking odors, not alone from the ranges, but also from vegetable boilers, so as to avoid nuisance in other parts of the building and in the neighborhood. The Underwriters' Association now requires that ventilation ducts from large ranges be built of heavy iron plate and carried through the top of the building without other connections, so that the grease and soot may be burned out of them as from a chimney flue, without incurring fire danger to other rooms.

4. Ample toilet facilities and wash rooms, separate for each sex, and apart from those provided for the public, must be furnished. The wash basins should be loacted outside of the toilet rooms in order that it may be apparent to those in charge that the hands are cleansed after leaving the toilets.

5. Proper locker rooms, with exceptional means of ventilation, must be provided in order to avoid the nuisance of the storage of either street or working clothes in tightly closed cupboards.

6. Well ventilated refrigerators are required in numbers sufficient to afford a separation for the different classes of food, especially for milk and butter.

The best examples of the application of these rules of design to new bakeshops and kitchens are to be found in the upper stories, preferably the top story, of certain high buildings. Such installations of superior type are at present by no means rare.

It may be pertinent to this discussion to inquire what influences in the community will give support in cases of official action for the suppression of these submerged nuisances.

We do not need to predict that all the bakers, cooks, waiters and scullions will show a lively interest in efforts made to improve conditions which mean death or life to them. As regards the customer or consumer, he needs only the pointing hand of authority to suggest which establishment should be patronized and which avoided by him. The proprietor

will require for his conversion, argument, persuasion and sometimes the strong hand of the law. It is by no means easy to convince him that success in his business depends upon the restoration of public confidence in his plant and his products. The property owner will at first bluster about vested interests and his right to lease his cellar, as heretofore, whether it be suitable or unfit, for food production uses. After consultation with his lawyer, he will express sympathy with the progressive attitude of the authorities and a desire to make any changes they may suggest to make his building acceptable. When advised that no changes are practicable, he will remonstrate, but will shortly acquiesce in the decision. The legal obstacles interposed to the execution of laws aimed against underground occupation will be less formidable than anticipated. No lawyer in his right mind will, after careful consideration of the present scope of the police power, advise a client to oppose the will of the people in this regard. Judges and juries affected by the current wave of interest in public health, will prove sympathetic with the reform. Above all other sources of encouragement, the newspapers, quick to note the public pulse, will respond, both in news and editorial columns, with hearty endorsement of the movement.

It is not too much to hope, or indeed to prophesy, that within the life span of a generation, the industries of food making will cease to inhabit caverns and dungeons of the earth and will come to the surface to be carried on amid appropriate surroundings of daylight and fresh air, without which the normal human existence and day's work is impossible.

SAVING CHILDREN FROM MILK-BORNE DISEASES.*

By NATHAN STRAUS.

The old city of New York (now the Borough of Manhattan), has established a new record in the saving of the lives of babies. Notwithstanding unusually severe periods of intensely hot weather the past summer, there have been fewer deaths of children under five years than in any preceding summer, and for the first time in the history of the city the summer mortality has fallen to a rate less than fifty per thousand per annum.

When I first undertook to protect the babies of New York from milk-borne diseases by supplying pasteurized modified milk in 1892, the summer saw the dying of 6,612 children under five years, making the rate per thousand per annum 136.1. With the steadily increasing use of pasteurized milk there has been a steady decline in infant mortality, until the summer just ended showed only 3,900 deaths in a population of children larger by 125,000 than that of 1892.

In other words, in 1892, 964 children out of every 1,000 survived the summer, while in 1910 there were 988 who escaped death out of each thousand.

That the pasteurization of milk fed to children has been a considerable factor in this achievement none may deny, for the prevention of sickness and death proceeds inevitably from the destruction of the germs that cause illnesses and that slay the little ones.

These facts are too elementary to be recited before the American Public Health Association. They are set forth fully in the thorough exposition of the milk problem by the Federal Public Health Service in the Bulletin, "Milk and Its Relation to the Public Health," which Surgeon General Wyman summarized in the words, "Pasteurization prevents much sickness and saves many lives."

This epitome of the results of the Federal Milk Investigation ought to be the battle cry of the forces united in the warfare against preventable diseases. Of all preventable diseases the most prevalent are tuberculosis, typhoid and scarlet fevers, diphtheria and the intestinal disorders of infancy; the specific germs of each may be and often are transmitted to the human system in raw milk, and these germs are rendered harmless by proper pasteurization.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

We ought to recognize that the disease now attracting so much attention—infantile paralysis—has all the appearance of a germ disease, occurs among infants whose only food is milk, and is probably prevented by pasteurization. I venture this presumption because of the fact that this disease has never occurred among the babies fed upon the milk pasteurized at my laboratories. I submit this fact in the hope that this practical experience may be used to the protection of child life while scientists are engaged in the tedious effort to isolate the germ.

If resort to pasteurization precedes scientific justification in the case of infantile paralysis, this method, as applied to the diseases known to be milk-borne, follows and confirms the discoveries of science.

My recent experience at Sandhausen, Germany, may be cited. The death rate among babies under two years of age had averaged 46 per cent for five years. I pasteurized the milk for most of the babies, and the death rate fell to less than 20 per cent. I pasteurized the milk for all the babies of the village, and last July there were no deaths at all.

Again at Karlsruhe, instead of 26 per cent of the babies dying in a year, the rate was reduced to 16 per cent by pasteurization of the milk fed to about one-fifth of the whole baby population. These children were of the poorer classes, among whom the death rate had been higher than the average for the city. After these babies had been fed upon pasteurized milk the death rate among them fell to less than seven per cent.

All of which confirms and emphasizes the warning uttered by the eminent Prof. Jacobi at a meeting of child-saving agencies at the New York Health Department last spring. He had listened to the broaching of various ideas that had been put forth for approval of the conference. The most important thing, said the greatest authority on the care of infants, is this: "Use no raw milk."

There is no division of science upon this point. No competent authority has ever disputed the fact that pasteurization kills the germs of disease, while it in no way impairs the nutritive value or the digestibility of the milk.

My practical experience in saving children from milk-borne diseases warrants the assertion that the pasteurization of the milk supplies of our big cities, under careful Health Department supervision, would infallibly reduce the number of cases of infectious diseases and save lives of babies.

In no way could the American Public Health Association save so many mothers from bitter grief and loss of their little ones as by hastening the time when efficient pasteurization will be the rule and when the milk-borne diseases will be as rare as the plagues that medical science has practically abolished.

Section of Municipal Health Officers

THE TRAINING OF JANITORS IN SANITARY CARE OF SCHOOL PREMISES.*

By Dr. HELEN C. PUTNAM,
Providence, R. I.

The Department of Science Instruction of the National Education Association during the recent meeting at Boston appointed a committee of three to report on suitable methods of securing sanitary care of school premises through the training of janitors. An advisory committee of experts in sanitation is associated.

Vital statistics of tuberculosis among teachers, and data from autopsies, X-ray and tuberculin tests concerning tuberculous lesions among children are ample reasons in themselves, if there were no others as unfortunately there are, for training competent care-takers of schools, where law compels children to congregate, and where the country's health habits and health ideals are formed.

Standards of school cleanliness should equal those of the best hospitals and private homes. The factor in school environment most completely under control of school authorities that most affects efficiency both at school and in future life is schoolhouse air. The official having direct and continuous charge of the air is the janitor who has to deal with details of dust, humidity, temperature and effluvia. This responsibility is given to those who make no pretense of fitting for sanitary duties or inspection; who do the best they know how with picked up knowledge.

Teachers are usually expected to report neglected details to the principal who is nominally responsible for sanitary conditions. All good housekeepers know that such matters require persistent following up of the worker. Thus the teacher must "nag" the principal and "tell on" the janitor, both usually men with no training beyond what unstandardized experience has given them. Teachers can hardly be blamed for neglecting this thankless task that creates hostility and jeopardizes their positions while probably not securing the results desired.

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, Spetember, 1910.

When janitors have the management of high pressure engines, engineer's licenses are required. A few cities have civil service examination for janitors, chiefly relating to their common education and previous experience. Massachusetts has civil service examinations that in sanitation are practically nominal, as few men eligible in other respects apply, and there are no provisions for instruction in sanitary care of schools. In consequence the appointing of janitors from civil service lists is fallen in discredit among many school officials who find experienced janitors more satisfactory.

The training and testing of care-takers of school premises is, however, as logical and imperative a need as is that of teachers, nurses, librarians, drug clerks; or of housekeepers, cooks, and other domestic workers, rapidly coming to pass. It is a vital factor in problems of school hygiene, and is likely to be the most effective means of educating other school officers in sanitation. Salaries paid janitors in large cities, ranging from $700 to $2500 and $3000, average higher than salaries of teachers, post-office employes, or assistant librarians, the formalities of whose appointments are well known.

Courses for janitors can be introduced in trade or technical schools, vocational or continuation schools. During the coming winter one or more biologists, possibly other science instructors also, and possibly one or more boards of health are planning experiments in talks, demonstrations, and other methods with classes of janitors.

Studies of schoolhouse air show humidity often nearer 20% than the normal 40%; temperatures are more often in the 70's and 80's than in the healthful 60's; carbon dioxid, indicating animal exhalations, more often measures 20 parts in 10,000, i. e., technically bad air, than the normal 4 in 10,000; anemometers prove many ventilating flues out of order through neglect. Dust, foul floors and air, which are the rule, are what no good home maker or hospital official would tolerate.

Meanwhile a very few schoolhouses, even in "soft coal cities," by no means the most expensive structures, have floors as clean as the home or hospital; a few others are practically free from dust; a few others have good air; a few schoolrooms have temperature at 68 degrees or below, with red cheeked pupils and teachers, who become depressed and dull in warmer air when it accidentally exists.

Such schools and schoolrooms prove the possibility of achieving each of these results even in buildings that are not equipped with elaborate and expensive heating and ventilating apparatus that forbids opening windows and is frequently out of order. Open air schools are likewise demonstrating the wholesome reaction of children to cool air of sufficient humid-

ity and comparatively free from dust and effluvia. In them delicate children invariably make more rapid progress mentally as well as in health.

Among the teachers of janitors it is desirable to include instructors from schools for nurses and domestic science, as the service required is technical and practical, to be held to definite standards which thus far have been best demonstrated in these two lines of education. In addition, health officers, biologists, and instructors in physics and chemistry can be of service in creating standards and testing results. It is also important to secure the co-operation of these men and women in establishing classes for janitors on a permanent basis in the right educational institutions.

Every large city has several hundred janitors, not of schools alone, but of apartment houses, office buildings, theatres, churches and entertainment halls; also Pullman porters, train and street car conductors, hotel managers. With different grades of examination as in the United States postal service, this course can be adapted to each form of custodial care.

We are seriously afflicted by unsanitary public buildings (including schools) and conveyances. The public good demands that educational and health standards be introduced in these important occupations that have been mentioned.

It is a hopeful sign that the National Education Association has taken a so evidently practical first step in school hygiene. The co-operation of health officials will encourage further undertakings. The committee will greatly appreciate any information concerning sanitary care of school premises; it will be of special value in the discussion at the annual meeting next summer at San Francisco.

On July 13th, 1911, a session will be given to two topics: I. Assuming that schools should be not less wholesome than the best kept homes from which pupils are taken: What are permissible limits of variation in sanitary details that may be under teachers' advisement or control (dust, temperature, odors, cleanliness, light, humidity, for example)? How are such standards determined? How are such details to be conveniently measured as heat is measured by a thermometer? II. By whom and how should janitors be trained and tested in sanitary care of school premises?

The committee's indebtedness for any co-operation will be acknowledged in its report.

Feb. 21st, 1911. H. C. P.

Laboratory Section

ELECTROLYTIC PRODUCTION OF SODIUM HYPOCHLORITE.*

By CHARLES POTTER HOOVER,
Assistant Chemist, Water Purification Works, Columbus, Ohio.

So much has been said and written about the use of hypochlorite, and so many cities and towns have adopted it for disinfecting their water supplies, that we seem to be living now in the age of hypochlorite.

From the very beginning of this movement many chemists and engineers have felt that the public would object to the application of bleaching powder to their water supply, and also knowing some of the disagreeable features incident to its use, felt that the very unique and attractive method of passing an electric current through salt water would not only overcome all aesthetic objections to the disinfection of public water supplies, but would offer a clean, cheap and attractive method of purification.

Calcium hypochlorite, the active constituent of bleaching powder, has, however, been almost universally adopted in preference to the sodium-hypochlorite produced electrolytically, for the reason that no electrolyzer has been put on the market that has proven itself successful from an economical standpoint, for water purification at least, and any new process, no matter how ingenious or unique, must be able to produce a better product, or the same product at a less cost, before it can hope to supplant older and tried out methods.

Charles Watt was the first chemist to discover (1851) that hypochlorite solutions could be produced by electrolysis. The electrolytic production of hypochlorite then remained dormant until 1884. Since that time a number of cells have been developed, but the original reactions and principles are the same as patented by Watt and the electrolyzers that have been developed since differ only in points of construction.

There are two general types of electrolyzers for dissociating sodium chloride. In one the cathodic and anodic products are allowed to recombine in the main body of the electrolyte and in the other, known as the diaphragm process, the products are removed separately from the cell as produced.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

For the production of sodium hypochlorite the non-diaphragm process has been considered best because it dispenses with the destructible diaphragms and the loss of energy that all such diaphragms occasion.

As previously stated the hypochlorite cells differ only in matters of construction and may be described as follows:

The bath is divided into compartments by numerous electrodes with small spaces between them, through which the salt solution is made to circulate. Each set of two electrodes becomes a cell, and the vat a battery of cells. By adopting this chamber arrangement or multipolar electrode arrangement, hypochlorite electrolyzers can be built to utilize almost any current conditions that are available. For instance, if a dynamo of 220 volts and 25 amperes is at one's disposal 50 electrode plates can be employed, forming 49 cells. In each cell there will be a tension of 4.5 volts and a current of 25 amperes will pass; thus the action of a current of 4.5 volts and 1225 amperes will be attained.

When a direct current of electricity is passed through a solution of sodium chloride, sodium is liberated at one pole and chlorine at the other. The liberated sodium reacts on the water breaking it up into hydrogen and hydroxyl ions to form sodium hydrate. The sodium hydrate in turn combines with the chlorine to form sodium-hypochlorite. (Na O Cl.)

There are however, many side reactions taking place and what actually happens in the electrolytic production of sodium hypochlorite solutions is about as follows:

First, electrolysis of sodium chloride with formation of sodium-hydrate, hydrogen and chlorine. Second, formation of sodium hypochlorite, by action of chlorine on sodium hydrate. Third, formation of sodium chlorate by oxidation of sodium hypochlorite. Fourth, electrolysis of sodium hypochlorite and chlorate as soon as they begin to be present in appreciable amounts. Fifth, the reduction of the sodium hypochlorite by the action of hydrogen produced at the cathode. Here we have the electrical energy impressed on the electrolyte first consumed in oxidizing chloride to hypochlorite and subsequently reducing it again to chloride, the net result being the conversion of electrical energy into heat, heat favoring the formation of chlorates.

The side reactions make it difficult to build high current efficiency cells.

Two methods have been suggested for preventing the oxidation of the hypochlorite to chlorate.

First, by keeping the electrolyte at a very low temperature.

Second, Lunge* has suggested that enough sodium, calcium or magnesium hydrate be added to absorb and utilize the excess chlorine usually found in electrolyzed salt solutions, since the presence of free chlorine is favorable to the conversion of hypochlorite to chlorate.

A method for checking the reducing action of hydrogen on the hypochlorite is described in an English patent. The electrolyte is made by adding to every 14 liters of 10% salt solution, 40 grams of calcium chloride, 30 grams of lime and 50 cc. of a strong solution of resin in caustic soda. In this way, a film, probably calcium resinate, is formed on the cathode and hinders the hydrogen from acting on the hypochlorite.

In the electrolytic dissociation of sodium chloride there is a definite minimum voltage required for carrying out the reaction, and this voltage figured according to the thermochemical equation is computed to be 2.3 volts, but Lunge† has shown that in the production of sodium hypochlorite where the chlorine formed at the anode combines with the sodium hydrate formed at the cathode, the calculation is different and the minimum theoretical voltage required to carry out the reaction is 3.54 volts.

Taking this minimum theoretical voltage required to bring about the desired reactions, one kilowatt gives 282 amperes. One ampere hour is theoretically capable of producing 1.32 grams of chlorine, so that 1¼ kilowatt hours are necessary to produce one pound of available chlorine. This represents a process of 100% efficiency on both current and energy basis. One pound of available chlorine represents the dissociation of 1.6 pounds of salt. (Na Cl.)

Placing a value of two cents per kilowatt hour on the current, and assuming the cost of salt to be three pounds for one cent, the cost of one pound of available chlorine would be a little more than three cents. One pound of available chlorine as bleaching powder costs in the market from 3.5 to 4 cents.

The electrolyzers that have already received industrial trial have shown very low efficiencies.

Roscoe and Lunt‡ discuss in detail the results obtained by electrolyzers that had received industrial trials up to 1895.

According to their figures:

The Corbin	cell	showed	an	energy	efficiency of	21%
The Hermite	"	"	"	"	"	23%
The Kellner	"	"	"	"	"	25%
The Woolf	"	"	"	"	"	31.5%
The Vogelsang		"	"	"	"	35.5%

* Journal Soc. of Chemical Industry. 1885, page 722.
† Sulphuric Acid and Alkali. Lunge. Vol. 3, page 637.
‡ Journal Soc. of Chemical Industry. 1895. page 24.

Taking the best of these we find that with the current costing 2 cents per kilowatt hour one pound of available chlorine would cost 5.5 cents for elcetrical energy alone.

Among the more recent cells that have attracted some attention are the Dayton Cell and the Hass-Oettel. The first is described by Rickards* and his most favorable results show that one pound of available chlorine can be made with 2.62 kilowatt hours of current and 6.9 pounds of salt. These figures were obtained by keeping the electrolyte at a very low temperature by means of ice. Without the cooling process 3.62 kilowatt hours and 7.2 pounds of salt were necessary.

With the second cell Duckworth† was able to make one pound of available chlorine using 2.84 kilowatt hours and 11 pounds of salt.

In our own experiments and in the practical operation of the cells that have been subjected to practical tests, it has been necessary to use an electromotive force of 4 to 4.5 volts to carry the current through the salt solution. On account of the side reactions involved current efficiencies have been low, and owing to the fall in efficiency which accompanies the proportion of hypochlorite present in the electrolyte, the resultant liquid always contains large quantities of sodium chloride in its original form and rarely more than 18% or 20% of the chlorine present in the form of chloride is converted into hypochlorite. Even though a cheap current is available, further salt savings than have yet been secured are necessary, before electrolyzers, in which the recombination of the anode and cathode products take place in the main body of the electrolyte, can compete with calcium hypochlorite.

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* Quarterly Bulletin Ohio State Board of Health, Oct.-Dec., 1909.

† Soc. of Chem. Industry. Nov., 1905.

AN EMERGENCY HYPOCHLORITE PLANT.*

By H. A. WHITTAKER and J. A. CHILDS,
Minnesota State Board of Health.

During the past two years the hypochlorite treatment of water has rapidly come into use. The results secured in various sections of the country seem to point to treatment with this disinfectant as a very satisfactory method of sterilizing most public water supply. In Minnesota calcium hypochlorite has been used in several instances with success. The small amount of apparatus required and the low cost involved in purifying large amounts of water has made this method especially desirable. This makes it possible to install small plants quickly, thus rendering this treatment applicable to the disinfection of infected water supplies. In localities where the epidemiological and analytical evidence points to a contaminated water supply as the cause of an epidemic, sterilization of the water is necessarily the best means of preventing further infection. In such cases immediate sterilization is necessary as it is impossible to prevent a certain percentage of the population from drinking the water even with the most efficient publicity on the part of local health departments.

The only means of protecting those who disregard the orders of the health department or who fail to learn of the infection of the supply is to render it potable as soon as possible.

Whenever it has been necessary to install an emergency hypochlorite plant in the small municipalities of this state the time required has usually consumed the greater part of a week and in some cases has been even longer. This delay is usually caused by lack of material with which to properly construct the apparatus necessary to administer the chemical. This gives opportunity for further exposure to infection. After actual experience of such delays in installation, the idea suggested itself to one of us (H. A. W.) that a small emergency plant could be constructed and kept in readiness by the State Board of Health. Such a plant could be transported by express to any municipality in the state within a period of 24 hours and could in most instances be installed and in operation within 48 hours. This saving in time would undoubtedly result in the prevention of a number of infections. This plan of constructing and keeping constantly on hand a portable emergency hypochlorite plant was pre-

* Read before the Laboratory Section of the American Public Health Association, at Milwaukee, September, 1910.

sented to the Minnesota State Board of Health at a recent meeting. The construction and maintenance of such a plant was authorized and designs are in course of preparation by one of us (J. A. C.) along the following lines:

Briefly this plant will consist of the following parts: Mixing tank, storage tanks and administering device.

The mixing tank will be about 30 inches in diameter and of equal depth. A conical chamber is placed inside of the tank, with its small end fixed about an inch from the bottom. A propeller is made to revolve within this conical chamber which causes the solution in the tank to circulate through the cylinder in either direction as desired, thus securing rapidly a uniform solution.

From the mixing tank the solution is drawn into the storage barrels which are two in number and used alternately. These storage barrels are of about 50 gallons capacity.

From the storage barrels the solution is fed into the administering box in which a constant level is maintained and from which the solution is fed to the water supply at the desired rate.

It is estimated that this plant will easily treat a water supply at the rate of one million gallons per day, which is about the maximum consumption of most of the smaller municipalities of Minnesota.

As the plans of the plant are now being drawn, it is impossible at this time to present a sketch, but the complete description will be published later in some engineering journal.

A REPORT ON THE HYPOCHLORITE TREATMENT OF WATER AT MINNEAPOLIS.*

By Dr. J. F. CORBETT, Bacteriologist.
Minneapolis, Minn.

The object of this report is to colaborate a large amount of data concerning the physical, chemical and biological properties of the water before and after treatment with hypochlorite. From the mass of collected data, it was hoped that some rule might be deduced to determine the amount of chlorine necessary to sterilize water of varying composition. In reviewing the results of 300 chemical and 5000 bacteriological analyses, no definite formula for the use of hypochlorite could be established. There is no absolute ratio between the albuminoid ammonia, the bacterial count, the temperatures of the water, or any other chemical ingredient. Further than this, it was hoped that a careful record of the size of the suspended matter contained in the water might give some clue as to the theoretical amount of chemical to be used. From the table appended, it is apparent that there is a general ratio between the figures expressing the extent of these masses and the amount of chemical required for sterilization.

The amount of hypochlorite used in this plant has been experimental—that is, the least amount that would destroy all colon in the water. During a period of twenty-four hours, it was found that at times much less hypochlorite was required than at other times, probably due to variation in the physical constituents of the water. In running the plant, sufficient chemical was used to destroy the colon bacilli at the most refractory period. In the table is given the average of the analyses for each month before and after treatment, together with the amount expressed in terms of "available chlorine" in parts per million used. It will be noticed that there was a decrease in albuminoid ammonia after treatment with hypochlorite. The reduction varied at different times. In May it was necessary to use 3.04 parts per million available chlorine to destroy the colon, with an average reduction of albuminoid ammonia from .240 to .152; in June 2.94, with a reduction of from .331 to .153. In July only 2.45 parts per million of chlorine were required to reduce a higher albuminoid ammonia—3.98 to 3.50 parts.

There is shown a rise of four parts per million in the alkalinity following treatment. The chlorine is increased from four-tenths to one-tenth of

* Read before the Laboratory Section of the American Public Health Association, at Milwaukee, September, 1910.

one part per million at the end of 20 minutes, and 2 parts at the end of 48 hours. The color and odor was not affected.

The change of inorganic residues is probably due to a varying amount of sedimentation that occurs in the fore-bay just before the water is pumped. No apparent decrease in the organic residues is demonstrable. This may be due to the physical state of much of the suspended matter. Large masses occur in the raw water that escape in the analyses. These masses are ground up by the pumps and appear in the analyses of the treated water.

In order to make clear the time at which these samples were taken, a slight description of the plant is necessary. The capacity of the plant is forty million gallons per day. This water is taken from the Mississippi River by two pumping stations. The hypochlorite is added before the water enters the pumps so as to insure thorough mixing. Chemical and bacteriological analyses were made of the water as follows: First, twenty minutes after treatment; second, as it enters the reservoir at the inlet; third, as it leaves the reservoir, or outlet; and fourth, examination was made at the tap in the central laboratory of the Minneapolis Health Department. Two hours are required for the water to reach the reservoir, and thirty-six hours for the water to find its way to the outlet.

From the bacteriological returns it may be seen that during the winter months—February and March, when the reservoirs are frozen over, either as the result of low temperature or as a result of having closed reservoirs, the action of the hypochlorite extended to the time that the water was delivered to the pipes. On the other hand, in the summer months, the action of the hypochlorite is much more rapid, and is thoroughly exhausted before leaving the reservoir.

ANALYSES OF MISSISSIPPI RIVER WATER BEFORE AND AFTER TREATMENT WITH VARIOUS AMOUNTS OF BLEACHING POWDER EXPRESSED AS PARTS PER MILLION AVAILABLE CHLORINE.

COLOR				TURBIDITY			
Month	Raw	Treated	Parts per Million Chlorine Used	Month	Raw	Treated	Parts per Million Chlorine Used
Feb.	30		1.34	Feb.	2		1.34
March	40		1.68	March	10		1.68
April	45	40	2.01	April	10	5	2.01
May	45	45	3.04	May	5	5	3.04
June	34	34	2.94	June	10	5	2.94
July	28	27	2.45	July	15	5	2.45
Aug.	23	23	2.37	Aug.	5		2.37

FREE AMMONIA				ALBUMINOID AMMONIA			
Month	Raw	Treated	Parts per Million Chlorine Used	Month	Raw	Treated	Parts per Million Chlorine Used
Feb.	.155		1.34	Feb.	.200		1.34
March	.027		1.68	May	.180		1.68
April	.070	.067	2.01	April	.260	.200	2.01
May	.067	.051	3.04	May	.240	.152	3.04
June	.046	.029	2.94	June	.331	.153	2.94
July	.039	.040	2.45	July	.398	.350	2.45
Aug.	.093	.093	2.37	Aug.	.382	.300	2.37

ALKALINITY				CHLORINE			
Month	Raw	Treated	Parts per Million Chlorine Used	Month	Raw	Treated	Parts per Million Chlorine Used
Feb.	182		1.34	Feb.		A. B.	1.34
March	130		1.68	March	1.1		1.68
April	140	146	2.01	April	1.3	1.7 3	2.01
May	144	148	3.04	May	1.6	1.7 4	3.04
June	155	159	2.94	June	1.7	1.8 4	2.94
July	161	163	2.45	July	1.5	1.7 4	2.45
Aug.	165	169	2.37	Aug.			2.37

A—At end of 20 minutes. B—At end of 48 hours.

INORGANIC RESIDUES				ORGANIC RESIDUES			
Month	Raw	Treated	Parts per Million Chlorine Used	Month	Raw	Treated	Parts per Million Chlorine Used
Feb.	122		1.34	Feb.	51		1.34
March			1.68	March			1.68
April	99	101	2.01	April	86	80	2.01
May	120	135	3.04	May	83	94	3.04
June	110	113	2.94	June	97	97	2.94
July	112	110	2.45	July	83	83	2.45
Aug.	114	113	2.37	Aug.	90	92	2.37

BACTERIAL COUNT IN MISSISSIPPI RIVER WATER

Month	River	Lab.	Inlet	Outlet	Tap	Parts per Million Chlorine Used
Feb.	207		220	187	72	1.34
March	1100	365	133	98	87	1.68
April	8000		1200	1750	2800	2.01
May	7500	520	600	1250	1250	3.04
June	6000		274	1700	1110	2.94
July	6000		1090	3400	1200	2.45
Aug.			213	3290	2000	2.37

MICROSCOPIC ORGANISMS, RAW WATER

April	165
May	236
June	131
July	138
August	205

SIZE OF SUSPENDED MATTER, RAW WATER

April	15
May	18
June	17
July	14
August	14

THE RESISTANCE OF CERTAIN BACTERIA TO CALCIUM HYPOCHLORITE.*

By F. F. WESBROOK, H. A. WHITTAKER, B. M. MOHLER.

In the treatment of Mississippi River water with calcium hypochlorite, it is found impossible at times to get complete sterilization even by the addition of large amounts of this disinfectant. The presence after treatment of a residual bacterial count caused the writers to conduct certain laboratory experiments with the raw river water. These experiments included the application of various amounts of the chemical to determine the resistance of the common forms of bacteria present.

The complexity of the problem of estimating the results of treating the raw water increases directly in proportion to the number of varieties of the organisms present. It seemed wise therefore, to simplify the problem by studying the effect of the treatment of water artificially infected with a pure culture of a given bacterium and to study in this way a number of different varieties and strains. The organisms selected were those isolated themselves from water or which, although obtained from other sources, are frequently found in water. It was felt that when the strength of the chemical necessary to produce complete sterility had been ascertained, and the effect of time, temperature and other such variables had been noted for a number of different bacteria and strains studied independently, it might prove simpler to gain some idea of the processes which occur in the treatment of waters naturally or artificially infected with combinations of the same organisms.

The experimental work on individual organisms, described in detail in the body of this paper, includes the treatment in pure culture of a resistant spore former isolated from the river water, and also cultures of *B. coli* and *B. typhosus*. The work on *B. coli* and *B. typhosus* later developed into a comparative study of the resistance of different strains of these bacteria in pure culture isolated from divers sources.

METHODS OF PREPARATION AND TREATMENT OF RAW WATER AND PURE CULTURES.

The water used in these experiments was collected without treatment from the Mississipi River at Minneapolis. That used for the suspension of pure cultures was sterilized by passing it through a Pasteur filter. The

* Read before the Laboratory Section of the American Public Health Association at Milwaukee, September, 1910.

sterile filtrate was inoculated in bulk from 24 hour agar slants of the organism to be treated and placed in 200 cc. amounts in 300 cc. sterile flasks. The calcium hypochlorite solution was then added in amounts necessary to treat the water with a definite quantity of chemical. An untreated control was run with each experiment. The amounts of calcium hypochlorite added are expressed in parts per million of available chlorine. Agar plates were made from these flasks at set intervals, to determine the amount of disinfection in a given time. The largest amount of any sample plated for a bacterial count was 1 cc. and dilution for high counts was made whenever necessary. The flasks were kept at room temperature during the experimental work and the minimum and maximum temperature noted. The bacterial counts were made after 24 hours incubation of the plates at 37.5° C.

THE TREATMENT OF RAW MISSISSIPPI RIVER WATER.

The results secured by treating raw Missippi River water with various amounts of calcium hypochlorite are included in Tables 1, 2 and 3. The bacterial count in the untreated water used in Table 1 was low, yet in no instance was complete sterility reached within a period of 17 hours.

Tables 2 and 3 on samples of river water collected on different dates again show that complete sterility is not secured with the application of the amounts of chemical indicated. These tables also show that the count is at first materially lowered, after which a marked rise is indicated. This is illustrated in Table 2 on the 49 hour count and in Table 3 on the 24 hour count. The amount of chemical necessary to materially lower the bacterial content under conditions indicated in Table 1 is 0.17 parts per million of available chlorine, and an appreciable reduction is noticed with 0.034 parts. The marked reduction in Tables 2 and 3 appears to take place with amounts from 0.5 to 1.0 parts per million.

THE RESISTANCE OF A SPORE BACILLUS ISOLATED FROM MISSISSIPPI RIVER WATER.

The treated water in Tables 2 and 3, after the rise in count had occurred, was examined, and the predominating organism, practically in pure culture, was found to be a spore-forming bacillus. The characteristics of this organism are given later in this article.

The presence of these spore-bearing bacteria in the treated samples suggested spore formation as the means of preservation of this organism.

In order to test its resistance to calcium hypochlorite, it was treated in pure culture as indicated in Table 4. The method of treatment was

identical with that given heretofore in the general description under the treatment of pure cultures. The culture was, however, a mixture of a 24 hour and a six day agar slope. In this way a culture was secured containing an abundance of active bacilli and also a large number of spores. It appears from the results in Table 4 that a reduction in count follows treatment, which is probably due to the extermination of active bacilli, the spores remaining uninjured. The spores present in the treated water thus continued to develop when plated on the agar and are probably not exterminated unless germination takes place before the hypochlorite has been rendered ineffective by liberation or chemical combination.

THE RESISTANCE OF VARIOUS STRAINS OF B. COLI AND B. TYPHOSUS.

For this work, six different strains each of *B. coli* and *B. typhosus* were selected from laboratory cultures. All cultures were carefully tested and corresponded with the morphological and cultural characteristics of these organisms. The typhoid cultures responded also to the agglutination test.

As indicated, Tables 5 to 12 inclusive are on the treatment of *B. coli* cultures and Tables 13 to 19 inclusive on the treatment of *B. typhosus* cultures with calcium hypochlorite.

In order to have a comparative test of the resistance of the two organisms, cultures of colon and typhoid were treated at the same time and under identical conditions. The results expressed in the following tables were secured as described. (Table 6 with Table 13, Table 7 with Table 14, and Table 8 with Table 15.) A study of the tables indicates a variation in resistance to the chemical of the two organisms and even of the different strains of the same organism, which, however, should be studied further. The differences in resistance is better shown in Table 20, which compares the minimum amount of chemical necessary for extermination in the minimum time tested. Further tests should be made upon a fixed basis of time of exposure. In the comparison of Table 6 with 13 and Table 7 with 14 more chemical is required to produce sterility in the typhoid than the colon suspension, while in Table 8 as compared with 15 the colon requires the greater strength. Colon cultures in Tables 9, 10 and 11, and the typhoid cultures in Tables 16, 17 and 18, were treated at different times but under very similar conditions, the only variation being a slight difference in temperature. The results should therefore be comparable.

On examination of the tables just mentioned and Table 20—the summary—it is again evident that the amount of chemical necessary for

extermination of different cultures is a variable quantity. In order to treat cultures of typhoid and colon acclimated to a water existence rather than cultures sown directly from agar slants, the sterile water to be treated was inoculated separately with these organisms and allowed to stand for three days before applying the chemical. This method of procedure should afford a race of organisms actually born in the water, thereby more nearly approaching conditions in nature. Table 12 and Table 19 show the results secured by such treatment. On comparing the results with the former treatment of these cultures in Tables 10 and 15, it appears that the colon culture remains unaltered while the resistance of the typhoid has been reduced materially. The treatment here, as in those experiments just mentioned, is comparable in all tests with the exception of a slight difference in temperature.

The results as already stated show that different amounts of chemical are required to sterilize for different cultures and strains of both colon and typhoid. The minimum amount of chemical required in the minimum time tested for *B. coli* is from 1.5 to 3+ parts and for *B. typhosus* from 1 to 3 parts per million of available chlorine.

It appears in a general way that the sum total of amounts of calcium hypochlorite required to exterminate both organisms is about the same, yet in the selection of individual cultures considerable variation in the amounts actually required is indicated. The sum total of these results indicates in a very general way that we may be warranted in still using the presence or absence of colon bacillus in a water supply as our guide to the possible presence or absence of typhoid infection until such time as a more accurate laboratory test is available. The final check, however, on the value of the colon test in water disinfection will be the epidemiological data collected on typhoid infected water supplies before and after treatment.

SUMMARY AND CONCLUSION.

1. On treating the Mississippi River water even with large amounts of calcium hypochlorite it was found impossible to effect complete sterilization.

2. The predominant organism remaining after treatment was found to be a spore-bearing bacillus.

3. Treatment of this organism in pure culture has demonstrated a great resistance of certain spore forming bacteria to this chemical, which may be one of the factors, if not the most important one, in the failure to produce complete sterility, and is probably the cause of the later rise in bacterial count after treatment in certain of our experiments.

4. Results on the comparative treatment of *B. coli* and *B. typhosus* in pure culture show in a general way that the sum total of amounts of calcium hypochlorite required to exterminate both organisms is about the same, yet in the selection of individual cultures some variation in the amounts actually required is indicated. The results further demonstrate in a general way that pending the formulation of better technical methods we may continue to regard the presence or absence of colon bacillus in treated waters as the index of possible infection with, or freedom from, the typhoid organism.

5. It is hoped that investigations may soon be undertaken in this country or abroad which will seek to determine the effect of the variable factors responsible for variations in efficiency of sterilization procedures in which hypochlorites are employed.

These will doubtless include the study of the effect of organic materials in solution and suspension and other physical and chemical variations in the waters treated as also the nature, number and varieties of the organisms present in the solution, to which latter problem these experiments are a slight contribution.

The organism showed the following morphological and cultural characteristics:

Morphology—

Bacilli: size 1.2:5.7, μ; form—round, long rods; spore germination—terminal; staining reactions,—Gram negative, Loeffler's alkalin methylene blue, positive.

Motility: sluggish, progressive.

Cultural Features—

Agar stroke: growth—moderate, beaded, flat, glistening, white, opaque, correacious; odor—absent.

Agar stab: growth—uniform, filiform, tendency to beading.

Agar plates: growth—slow, colonous, round; surface—smooth, granular; edge—entire.

Potato: growth—scant, spreading, some beading, dull white.

Broth: no surface growth, moderately cloudy, viscid, some flocculence.

Litmus milk: acid, prompt reduction and coagulation, slowly peptonized.

Gelatine: growth best at top, liquification stratiform.

Physical and Bio-Chemical Features—

No production of indol in muscle-sugar-free broth.

TABLE 1. TREATMENT OF MISSISSIPPI RIVER WATER COLLECTED FROM MINNEAPOLIS CITY SUPPLY.

Available Chlorine p. p. m.	Bacteria per c.c. 17 hours exposure.					
	Date 12–1–08 Temp.19°-21° C.	Date 12–12–08 Temp.19°-5.5° C	Date 12–14–08 Temp.16.6°-19°C	Date 12–26–08 Temp.21°-18° C.	Date 1–4–09 Temp.18°-22° C.	Date 1-8-09 Temp. 19°-23° C.
0	325	190	164	127	186	118
0.017	..	..	..	..	140	..
0.034	..	..	..	..	72	80
0.068	..	..	..	..	..	70
0.085	..	..	..	..	60	..
0.136	..	..	..	..	..	70
0.170	..	..	..	..	10	..
0.272	..	..	..	..	..	10
0.340	..	..	..	..	1	..
0.408	..	..	..	..	..	8
0.510	..	40	7	6	..	..
0.544	..	..	..	..	..	1
0.680	..	37	9	5	2	2
0.850	20	37	11	18	..	..
1.700	8	23	16	2	..	..
2.125	10	..	..	..	..	..
3.400	..	20	12	3	..	..
4.250	1	..	..	..	..	..
8.500	2	..	..	..	..	..

TABLE 2. TREATMENT OF MISSISSIPPI RIVER WATER COLLECTED DIRECTLY FROM RIVER AT MINNEAPOLIS, MARCH 15, 1910.

Available Chlorine p. p. m.	Time Exposed (Temp. 18°-23° C.)						
	30 Min.	2 Hr.	3 Hr.	4 Hr.	25 Hr.	49 Hr.	73 Hr.
0	12,000	9,600	9,800	10,000	350,000	18,400	21,000
0.10	14,000	9,400	9,600	10,500	340,000	230,000	23,000
0.25	12,000	5,300	4,600	6,500	290,000	600,000	200,000
0.50	5,800	850	250	500	11,000	250,000	260,000
0.75	850	40	50	60	70	97,500	240,000
1.00	275	30	30	100	55	4,000	260,000
2.00	54	150	10	30	40	3,100	160,000
3.00	50	20	30	25	40	16,000	130,000
4.00	36	0	40	150	50	3,100	80,000
5.00	80	70	30	70	5	4,100	70,000

TABLE 3. TREATMENT OF MISSISSIPPI RIVER WATER COLLECTED DIRECTLY FROM RIVER AT MINNEAPOLIS, AUGUST 8, 1910.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-26° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	230,000	200,000	160,000	150,000	140,000
0.5	14,000	7,400	2,000	6,000	11,000
1.0	20	14	170	450	60,000
1.5	10	6	16	45	70,000
2.0	7	8	10	97	70,000
2.5	7	14	30	110	65,000
3.0	6	12	5	12	16,500

TABLE 4. TREATMENT OF SPORE BACILLUS ISOLATED FROM MISSISSIPPI RIVER WATER.

Available Chlorine p. p. m.	Time Exposed (Temp. 21°-24° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	3,500	3,500	3,500	3,200	2,100
0.5	3,700	2,400	2,400	3,800	3,000
1.0	1,300	2,200	2,600	3,600	1,800
1.5	2,400	2,300	3,000	1,100	1,400
2.0	2,800	2,400	1,700	1,200	1,800
2.5	2,500	2,300	1,200	1,200	1,900
3.0	2.300	1,100	1,300	1,200	2,200

TABLE 5. TREATMENT OF B. COLI CULTURE No. 1 ISOLATED FROM MISSISSIPPI RIVER, OCTOBER 22, 1909.

Available Chlorine p. p. m.	Time Exposed (Temp. 25°-25° C.)				
	45 Min.	1 Hr. 45 Min.	2 Hr. 45 Min.	5 Hr.	24 Hr.
0	5,500	6,100	5,600	5,300	13,000
0.10	9,900	9,300	9,200	7,500	44,000
0.25	9,800	7,000	8,300	6,700	18,500
0.50	3,300	4,500	4,600	5,800	4.700
0.75	16,600	7,700	4,800	7,000	15,500
1.00	1,700	6,800	4,900	4,600	11,000

TABLE 6. TREATMENT OF B. COLI CULTURE No. 1 ISOLATED FROM MISSISSIPPI RIVER, OCTOBER 22, 1909.

Available Chlorine p. p. m.	Time Exposed. (Temperature 22°-25° C.)			
	50 Min.	2 Hr.	4 Hr.	27 Hr.
0	1,200,000	1,700,000	1,100,000	1,800,000
1	30,500	1,300	80	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
10	0	0	0	0

TABLE 7. TREATMENT OF B. COLI CULTURE No. 2 ISOLATED AT AUTOPSY APRIL 4, 1910, FROM BLOOD IN HUMAN HEART.

Available Chlorine p. p. m.	Time Exposed (Temp. 23°-26° C.)				
	50 Min.	2 Hr.	4 Hr.	27 Hr.	75 Hr.
0	56,000	140,000	71,000	18,500	35,500
0.75	35,000	5,200	20	0	0
1.00	32,000	4,600	0	0	0
2.00	0	0	0	0	0
3.00	0	0	0	0	0
4.00	0	0	0	0	0

TABLE 8. TREATMENT OF B. COLI CULTURE No. 3 ISOLATED AT AUTOPSY, NOVEMBER 17, 1908. FROM HUMAN PERITONEUM.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-25° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	170,000	170,000	170,000	150,000	2,000
0.5	160,000	110,000	30,000	30,000	140
1.0	65,000	60,000	8,400	3,000	10
1.5	38,000	7,000	0	0	0
2.0	25,000	10	0	0	0
2.5	700	30	0	0	0
3.0	10	0	0	0	0

TABLE 9. TREATMENT OF B. COLI CULTURE No. 4 ISOLATED NOVEMBER 17, 1908, FROM HUMAN BLOOD CULTURE.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-25° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	71,000	110,000	89,000	87 000	91,000
0.5	44,000	27,000	5,900	80	2
1.0	15,000	450	0	0	0
1.5	5,000	0	0	0	0
2.0	140	0	0	0	0
2.5	60	0	0	0	0
3.0	15	0	0	0	0

TABLE 10. TREATMENT OF B. COLI CULTURE No. 5 ISOLATED FROM MISSISSIPPI RIVER WATER, JUNE 23, 1910.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-26° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	51,000	37,000	33,000	23,000	0
0.5	17,500	190	0	0	0
1.0	2,600	0	0	0	0
1.5	0	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 11. TREATMENT OF B. COLI CULTURE ISOLATED FROM MISSISSIPPI RIVER WATER, JUNE 23, 1910.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-26° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	41.000	34,000	33,000	23,000	0
0.5	26,000	3,700	0	0	0
1.0	7,500	0	0	0	0
1.5	0	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 12. TREATMENT OF B. COLI CULTURE No. 5 ISOLATED FROM MISSISSIPPI RIVER WATER, JUNE 23, 1910.

Available Chlorine p. p. m.	Time Exposed (Temp. 23°-28° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	2,000,000	2,500,000	2,900,000	3,100,000	5,400,000
0.5	1,320,000	914,000	67,000	20,000	16,000
1.0	90	80	20	10	5
1.5	0	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 13. TREATMENT OF B. TYPHOSUS CULTURE No. 1 ISOLATED SEPTEMBER 3, 1909, FROM HUMAN BLOOD CULTURE.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-25° C.)				
	50 Min.	2 Hr.	4 Hr.	27 Hr.	75 Hr.
0	15,500	1,700	1,000	0	0
1	170	55	0	0	0
2	100	10	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
10	0	0	0	0	0

TABLE 14. TREATMENT OF B. TYPHOSUS CULTURE No. 2 ISOLATED JANUARY 23, 1910, FROM HUMAN BLOOD CULTURE.

Available Chlorine p. p. m.	Time Exposed (Temp. 23°-26° C.)				
	50 Min.	2 Hr.	4 Hr.	27 Hr.	75 Hr.
0	61,000	55,500	54,000	240,000	1.000,000
0.75	64,500	43,500	53,500	220,000	650,000
1.00	40,500	53,000	47,000	140,000	600,000
2.00	30,500	400	0	0	0
3.00	0	0	0	0	0
4.00	0	0	0	0	0

TABLE 15. TREATMENT OF B. TYPHOSUS CULTURE No. 3 ISOLATED AT AUTOPSY OCTOBER 15, 1908, FROM HUMAN HEART BLOOD.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-25° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	24,000	22,000	16,000	14,000	13,500
0.5	18,500	18,000	15,000	13,000	10,000
1.0	10,500	4,000	0	0	0
1.5	250	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 16. TREATMENT OF B. TYPHOSUS CULTURE No. 4 ISOLATED AT AUTOPSY NOVEMBER 17, 1908, FROM HUMAN SPLEEN.

Available Chlorine p. p. m.	Time Exposed (Temp. 21°-26° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	89,000	88,000	93,000	91,000	51,000
0.5	78,000	62,000	61,000	16,000	0
1.0	3,900	0	0	0	0
1.5	550	0	0	0	0
2.0	325	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 17. TREATMENT OF B. TYPHOSUS CULTURE No. 5 ISOLATED AT AUTOPSY DECEMBER 19, 1908, FROM HUMAN SPLEEN.

Available Chlorine p. p. m.	Time Exposed (Temp. 22°-25° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	93,000	97,000	43,000	55,000	2,000
0.5	14,000	0	0	0	0
1.0	0	0	0	0	0
1.5	0	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 18. TREATMENT OF B. TYPHOSUS CULTURE No. 6 ISOLATED DECEMBER 25, 1909, FROM HUMAN BLOOD CULTURE.

Available Chlorine p. p. m.	Time Exposed (Temp. 20°-22° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	310,000	290,000	270,000	160,000	50,000
0.5	190,000	160,000	110,000	11,000	18,000
1.0	190,000	110,000	88,000	42,500	1,600
1.5	54,000	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 19. TREATMENT OF B. TYPHOSUS CULTURE No. 3 ISOLATED AT AUTOPSY, OCTOBER 15, 1908, FROM HUMAN HEART BLOOD.

Available Chlorine p. p. m.	Time Exposed (Temp. 23°-28° C.)				
	30 Min.	1 Hr. 30 Min.	3 Hr.	6 Hr. 30 Min.	24 Hr.
0	250,000	340,000	360,000	370,000	310,000
0.5	4,600	0	0	0	
1.0	0	0	0	0	0
1.5	0	0	0	0	0
2.0	0	0	0	0	0
2.5	0	0	0	0	0
3.0	0	0	0	0	0

TABLE 20. SUMMARY OF TABLES ON RESISTANCE OF B. COLI AND B. TYPHOSUS SHOWING THE MINIMUM AMOUNT OF CHEMICAL REQUIRED TO PRODUCE COMPLETE STERILITY IN THE MINIMUM TIME EXPOSED.

B. Coli				B. Typhosus			
Table No.	Culture No.	Time Exposed	Available Chlorine p. p. m.	Table No.	Culture No.	Time Exposed	Available Chlorine p. p. m.
6	1	50 min.	2	13	1	50 min.	3
7	2	50 "	2	14	2	50 "	3
8	3	30 "	3*+	15	3	30 "	2
9	4	30 "	3*+	16	4	30 "	2.5
10	5	30 "	1.5	17	5	30 "	1.0
11	6	30 "	1.5	18	6	30 "	2.0

* In these two treatments 3 pts., the maximum amount used, did not produce sterility in the time indicated in this table.

Notes and Reviews*

MUNICIPAL SANITATION NOTES.

CHARLES V. CHAPIN,
Providence, R. I.
(Reviewer.)

Relation of Flies to Disease. Hamer (Report of the Medical Officer of Health of the County, London, 1909, Appendix IV) has pursued his investigations on this subject, and continues to urge caution, as does his chief, Sir Shirley Murphy, in accepting the relation between flies and disease as established. He calls attention to the fact, that in London, in 1907 and 1909, the fly curves corresponded almost exactly, while the curves for diarrhea showed a marked contrast; that for 1907 only slowly attaining its maximum towards the end of September, while in 1909 it reached its maximum in August. He also notes that although both the diarrheal diseases and typhoid fever are alleged to depend, so far as their summer maxima are concerned, upon the prevalence of flies, the typhoid maximum, having reference to the date of infection, occurs both in England and America some three weeks later than the maximum of diarrheal infection. It has furthermore been observed that in England an excessive prevalence of diarrhea in a town is often not correlated with an excessive prevalence of typhoid fever. The same phenomenon is noticed in the United States. Thus Fall River has the highest death rate from diarrheal diseases and one of the lowest from typhoid fever. Jersey City, New York City, and Providence stand high as regards mortality from diarrheal diseases, but low as regards mortality from typhoid fever.

Seasonal Distribution of Lice, Bugs, and Fleas. Hamer (Report of the Medical Officer of Health of the County, London, 1909, Appendix IV) has been studying this subject in the London lodging houses. He assumes that the number of beds in these houses showing infestation with these insects, is an indication of their prevalence. (The use of infestation in connection with insect parasitism, in distinction from infection with the micro-organisms, is quite general, but it is a question whether there is any

Editor's Note: Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

such fundamental difference as this use of the word would suggest). Hamer finds that the maximum number of louse infested beds was during the first week in February, and gradually fell off to a minimum during the first week in June. The seasonal curve for bed bugs, on the other hand, was low during the winter, and gradually rose during spring and summer, attaining its maximum during the first week in September. The maximum for fleas also was in the first week in September but the number diminished less rapidly after that date than in the case of bed bugs.

Samples from Typhoid Carriers Difficult to Obtain. Johnstone (Report of the Local Government Board, 1909–10, XXXIX, Supplement, Report of the Medical Officer, 159) reports an interesting outbreak of typhoid fever at Jennet Hill, in England. Twenty-seven cases occurring since 1896 in a small village seemed in all probability to be due to a carrier. An attempt was made to secure samples of feces and urine from a large number of persons, but except in eighteen instances the attempt resulted in failure. Some claimed outraged modesty, others pleaded religious scruples, while others were simply obstinate. Four of the eighteen samples of feces showed the presence of typhoid bacilli, but Johnstone did not feel at all sure as to the real source of two of these specimens. The above is a good illustration of the difficulties which are likely to arise if health officials attempt a compulsory search for carriers, particularly if it is known that the carriers if found are to be at all restrained or annoyed.

Epidemic Diarrhea. O. H. Peters (Jour. Hyg. 1910 X, 602) reports a most careful statistical study of this disease in Mansfield, England, a town of about 30,000 inhabitants. The study is based on cases, rather than on deaths. These cases were obtained by a careful house to house canvass in certain selected districts. He believes that on this account his data present a truer epidemiological picture than we have before had of this disease. He believes that it is only by a most critical investigation in the home that all the cases of this disease can be discovered. Only about 12% apply for medical treatment, so that notification, even in the few cities where it has been adopted, entirely fails to show the prevalence of the disease. Peters finds that during the year 10% of the population are affected, with a case fatality of perhaps 1%. As hitherto, the mortality alone has usually been studied, we have been wont to consider it a disease confined chiefly to the first year of life, but Peters shows that while the case fatality and the mortality rapidly diminish after the first year, it is far different with the incidence of the disease itself. The largest number of cases are found in the second year, when they diminish until the twentieth year is reached, after which the disease again increases

in frequency. He believes that the period of incubation is short, from 6 to 36 hours, and that there is probably some immunity conferred by an attack. The duration of fatal attacks is usually about nine days, so that in studying the date of infection, the mortality curve should be put back that number of days. Although the number of cases involved in the study is not very large, they were most carefully collected, and their analysis is most minute, and Peters believes that his conclusions are fairly warranted. While, with others, he finds that the disease is far less common among breast fed infants, he believes this is due to the inhibitive action of the human milk, using the term inhibitive in its broadest sense. While cow's milk may be the bearer of infection, as are other foods, he does not believe that there is any warrant for assuming, as is usually done, that it is a very important vehicle of infection. Much attention is devoted to a consideration of whether the source of the infection is the soil, or human beings, and he finds that the evidence points strongly to the latter. He also finds a great amount of evidence showing that the disease is spread from individual to individual by what we call contact infection. The fly theory is subjected to a very careful analysis. No conclusive evidence is found for this theory, but a great deal is presented which favors it, and none which is strongly against it. Peters shows that it is by no means as necessary as some have claimed, that there should be an exact correlation between the fly curve and the diarrheal curve in order to render the fly theory probable. He finds that a careful analysis shows that the two curves, as worked out in London for instance, do not render untenable the causative relation of flies to epidemic diarrhea.

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Unrecognized Mischief in the Nervous System.

The "Ether Day Address" which was delivered in Boston on the sixteenth of last October by Dr. George W. Crile, is of uncommon interest.* In the first place it advocates measures in surgical practice which seem certain to result in the saving of many lives. In the second place it is full of suggestiveness for the reader outside the professional circle. Especially is it productive of texts for the preacher of hygiene. To abstract a paper so condensed and so manifold in its bearings is not entirely just to its author, yet we cannot refrain from the attempt.

The central emphasis is upon reflex action. The nervous system is for the most part engaged in the production of appropriate responses to the stimuli which beat unceasingly upon its receptors. Many of these reflexes are adapted to protect the organism against injury and such is the makeup of the brain and the spinal cord that the centres will expend their energy to the point of exhaustion and structural impairment in pursuit of this object. A surgical operation involves the severest stimulation of afferent paths through which strenuous defensive reflexes are normally excited. In the absence of an anaesthetic such stimulation would result in a bitter struggle continuing to utter prostration with both central and muscular damage. How far does anaesthia exclude this racking exercise of the nervous system? Not nearly so successfully, Dr. Crile thinks, as we have supposed. He has demonstrated that when a dog is placed under ether and its afferent nerves are irritated for some time the brain-cells exhibit changes in form and appearance. The alterations are of the same order as those long believed to signify profound fatigue. These changes are not due to the ether alone for they are not observed after anaesthesia without operation. They are therefore the result of the penetration of impulses to the gray matter and the discharge of the cells which in the waking condition have to do with powerful, protective reflexes. The anaesthetic has abolished the consciousness of pain, it has more or less checked muscular movement, but there is an amount of unavailing wear and tear in the centres hitherto unsuspected.

* The Boston Medical and Surgical Journal, December, 1910, Vol. CLXIII, p. 892.

We are reminded afresh that consciousness is associated with but a very limited part of neural activity. The conquest of pain by ether was a priceless boon, but to conquer pain is not necessarily to protect the vast fabric of the nervous system from the stress of over-stimulation. Two lines of advance are possible—to find a general anaesthetic that shall more completely shield the subconscious centres or to employ a local anaesthetic in addition to ether so that the hurtful impulses shall not ascend to the brain. The first desideratum is partially satisfied by nitrous oxide, an anaesthetic of which Dr. Crile is an able advocate. The second method of procedure also gives admirable results in his hands. The patient whose centres have been spared through the simultaneous use of ether to eliminate consciousness, and cocaine or some siniilar drug to isolate the field of the operation, is protected in a great degree from the dangers of shock or extreme exhaustion.

Let us now consider the realtion of this noteworthy contribution to Personal Hygiene. It teaches first of all that influences which are quite unfelt may be working harm within the nervous system. This is not new to be sure but it surely deserves more attention. Dr. Crile has dwelt upon the central injury proceeding from strong but relatively brief irritation; moderate but long-continued stimulation cannot be assumed to fail of effect. Long ago it was shown that during natural sleep the vasomotor centre gives reflex responses to shocks and sounds inadequate to rouse the sleeper. It is reasonable to infer that sleep in the midst of disturbing conditions falls short of its best effect even if the subject has schooled himself to remain apparently impervious to such stimulation. The insensible wear and tear experienced by one who lives near an elevated road has something in common with the damage wrought under an anaesthetic by unfelt irritation. In this case the "anaesthesia" consists in the cultivated power to sleep or, in waking hours, to attend to other things than the hideous sound. No doubt such discipline achieves a degree of protection. It is like ether in a surgical operation. But it is clear that we cannot assume that the power to turn the attention away from annoyance abolishes the injurious influence of the circumstance.

A capital example is that of a person whose health is undermined by eye-strain. A little far-sightedness has required the constant employment of the ciliary muscle and it has been denied its normal periods of repose. Or a typical astigmatism has induced the habit of rapidly shifting adjustment. The abused muscle or its governing centres may have radiated impulses to stations seemingly quite detached in locality and function. How profound the consequent disturbances may be is a matter of common observation yet the initial strain may have been but vaguely realized.

Finally, it is natural in this connection, to point out an element of danger in Christian Science and kindred cures. The primary step in such treatment is usually the suggestion of freedom from subjective symptoms. This is a form of partial anaesthia. Often it is induced with amazing success and often objective improvement follows. It may be almost a royal road to health where the original disturbance is capable of abatement through the modified activity of centres. But when the peripheral lesion is not to be healed by changes in secretion, blood-flow, or tonus, such treatment is on a par with the use of narcotics. It may be justified as a means of giving ease and serenity to the incurable. The mental adjustment that makes pain non-existent for the individual will always seem a display of moral heroism. But we have in Dr. Crile's address a valuable reminder that central mischief and subjective suffering are not inseparable. To remove the local cause of irritation is always better than merely to exclude its effects from consciousness. It is easy to conceive of cases amenable to medicine or surgery which under psychotherapy may show temporary improvement only to give evidence at last of the nervous disintegration which mental detachment could disguise but not prevent.

SANITARY ENGINEERING NOTES.

R. S. WESTON,
Boston, Mass.
(*Reviewer.*)

Water Supply of Jerusalem.* A description of the proposed water supply for Jerusalem. The population of the city is 80,000. The present supply is from cisterns. The annual rainfall is only 27 inches and much suffering and disease are caused, especially among the poorer people, by the scarcity of water. Evidently there has been a scarcity of water in Jerusalem for a long time. A masonry aqueduct, said to have been built in the time of Solomon, ran seven and one-half miles from the city on the road to Hebron to the Pools of Solomon. The source of this supply was impounded surface water augmented by a spring. In the sixteenth century the Mohammedans repaired this aqueduct and replaced the masonry with pottery pipes. Part of this aqueduct is still in use. In the second century the Romans projected an ambitious scheme which they did not seem able to finish. They took the water from reservoirs about twice as far from Jerusalem as the Pools of Solomon, and laid the pipe through a tunnel in the rock to this point, from which they started to run two aqueducts to the city. At one point a crossing of a ravine was attempted by means of a siphon made of hewn blocks of granite. The drought of 1901 drove the inhabitants to connect Jerusalem with the spring supplying the Pools of Solomon, but the four-inch pipe used is far too small for the needs of the city. A new supply is projected. A Bremen firm has made a proposition to put in a supply pumped from Ain-Fauwar situated seven or eight miles northeast of Jerusalem and 1640 feet lower. The old Roman source and the Pools of Solomon were investigated but the supply was not only too scanty but also required filtration. The proposal includes the turning of the property over to the city after thirty years. The rates for water will be $92 per million gallons. While the price seems high, public opinion seems to be in favor of this source, especially as the quantity is ample and the quality excellent, the water flowing from beneath rock cliffs.

* (Anon.) Eng. Rec. 62, 189. From recent Consular Report.

The First Garbage Reduction Works Built by an American City, Columbus, Ohio.* A detailed description of the new garbage reduction plant at Columbus, which was put into operation July 20, 1910. The garbage of the city is collected in covered carts and is delivered to a central station on the Hocking Valley Railroad, where it is dumped into cars by means of a power hoist which lifts the whole cart body from the running gear. Each evening the train hauls the garbage to the reduction plant four miles to the south of the center of the city, near the sewage disposal plant. The garbage is dumped from the cars, drained and sorted. The drainings are run into a catch basin from which they are discharged into grease separating tanks and afterwards evaporated. The garbage is sorted and conveyed by machinery to digestors. There are eight digestors, each 7 feet in diameter and 14 feet high. Each digestor holds from 10 to 12 tons of garbage. They are lined with concrete and tile to prevent abrasion and to resist the corrosive action of the acids in the garbage. After cooking the garbage is passed through roller presses which extract the water and grease. The vapors arising from the presses are taken to a condenser while the other vapors are trapped into the heat well and vent beneath the boilers. The mixed water and grease in the presses is conveyed to separating tanks, which are arranged in series. There are storage tanks for grease. The grease tank water contains from 5% to 7% of solids. This water is evaporated in a triple-effect. The tankage from the roller presses is dried in cylindrical dryers and afterwards screened. The concentrated syrup from the tankage evaporators is mixed with the screened tankage and the whole is dried in vacuum dryers. A percolating apparatus for extracting grease from dry tankage is now being constructed. The plant cost $180,000 and the sale of by-products thus far has paid for the cost of disposal.

Water Supply System of Santiago, Cuba.† A description and history of the Santiago water works, particularly of the new dam and reservoir in the hills and the improvements in the distribution system.

Water Purification Works at Canon City.‡ A description of the water works which consists of sedimentation basin, sand filters, and filtered water basin, all uncovered, of the usual type.

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* Osborn, I. S. Eng. News, **64**, 542-45.

† H. F. Cameron. Eng. Rec. **62**, 130.

‡ (Anon.) Eng. Rec. **61**, 82.

Sterilization of Water.* The authors give results of experiments which the Baltimore County Water & Electric Company have been making with slow sand and mechanical filters, with and without the aid of ozone and bleaching powder as sterilization agents. The results with the ozone sterilization apparatus are given and show considerable reduction in the numbers of bacteria. Since the construction of rapid filters at the Company's filtration plant at Avalon, Md., in 1908, bleaching powder has been used for sterilizing the water in connection with filtration at this plant. The chemical has been used continuously, not because of the failure of filtration alone, but to lessen the cost of operation and at the same time to deliver water which was practically sterile. Results show that the effluent from both slow sand and mechanical filters can be made practically sterile with a total elimination of *B. coli*, reducing the color from 5% to 15%; that it causes a reduction in the amount of alum and an increase in the length of runs between washings, and at the same time a reduction in the amount of wash water.

The calcium hypochlorite is more efficient when used with sulphate of alumina than when used alone.

The high turbidity in the raw water reduces the bacterial efficiency of the bleaching powder. The bleaching powder, even when used in large quantities, causes but a slight reduction in organic matter.

The bleaching powder was added directly to the reservoir water before filtration.

Operation of Settling Basins at Richmond, Va.† Since January 3, 1910, the new coagulating plant operating with muddy James River water has been in use for the supply of the City of Richmond. The reduction in turbidity and bacteria, also in the typhoid death rate, have been gratifying.

Creosote Treatment for Algae Growths.‡ Author describes his experience with the use of creosote applied annually to the water of the reservoir at Meridian, Miss. Less than 0.5 parts per million of creosote was added and as a result algae growths, as well as the presence of poisonous snakes, turtles, and eels, have been prevented.

Removal of Iron in Organic Combinations at Mount Hope, Canal Zone.‖ The water supply for the city of Colon, Panama, is so impregnated with iron held in suspension by organic matter that ordinary mechan-

* Walden & Powell. Amer. Water Works Assn. 1910, 128.
† Davis, E. E. Amer. Water Works Assn. 1910, 256.
‡ William F. Wilcox. Amer. Water Works Assn. 1910. 166.
‖ Downes, John R. Amer. Water Works Assn. 1910, 220.

ical filters became clogged rapidly. A coagulation basin was built to overcome this difficulty, with satisfactory results. The unfiltered water contains from 2 to 3 parts of iron per million and from 0.2 to 0.5 parts of N as albuminoid ammonia. The iron as well as the turbidity and color are practically removed and at a much reduced cost.

Porosity of Filtering Candles.* The author has made some experiments with porous filter tubes used in laboratories and households for filtering water, bacterial cultures, etc., and has found the efficiency to vary with the size of the pores. The bacterial efficiency is dependent upon both the true straining action and the capillarity of the pores. Grenet estimated the porosity of the tubes by determining the capillarity. The force varied with different tubes between 20 cm. and 2 m. of mercury. The method of testing is useful for the control of the manufacture of these tubes. Tubes or bougies should be saturated with distilled water before use. Otherwise the intensity of the capillary attraction may cause deep penetrations of organisms to be removed, some even passing through the walls. The efficiency of a bougie destroyed in this way is not restored by use.

Rapid Testing of Water.† An advertisement of the dionic tester invented by Digby & Briggs, manufactured by Evershed and Vignades, Chiswick W., London, England. This consists of a convenient portable apparatus for determining the electro-conductivity of water. The current is supplied by a small hand dynamo.

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* Grenet, F. Compt. rend., **151,** 941-43.

† (Anon.) Engineering. **90,** 807.

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

Carbonic or Other Acid Required to Decompose "Bleaching Powder."

Samuel Rideal calls attention to the fact that bleaching powder is disintegrated by carbonic acid and the "Hypochlorous acid" set free. He makes the following statements on pages 181 and 183 of his book entitled Sewage and the Bacterial Purification of Sewage, "When mixed with ordinary water containing carbonic acid, the latter decomposes the hypochlorite, setting free hypochlorus acid * * * ." And, "The soluble hypochlorites are alkaline; when acidified they give off chlorine or hypochlorous acid in vapour * * *. On the other hand the action of unacidified hypochlorites is very slow * * * ."

When the quick lime (CaO) used in water softening or for the precipitation of coagulants is added to purify a water it absorbs the carbonic acid which the water originally contained. As water softening and coagulation plants are increasing in number it is important to bear Mr. Rideal's remarks in mind. This fact is born out by the recent experience at the Columbus Water Softening Plant.

Early in the year 1909 the City Officials were advised to put hypochlorite of lime into the purified water to remove the few bacteria which the Water Softening Process had not destroyed. Early in December, 1909, the Scioto River being in flood, bleach was applied to the partially softened and settled water, at a point after the quick lime had been added. During a similar period in 1910 the bleach was applied to the raw water before adding the CaO. The bacterial results, obtained during these two periods are given in the following table.

Period	Bleach — Point Applied	Whole Numbers of Bacteria per C. C.						Presumptive Test for B. Coli.		
		River Water			Filtered Water			River Water	Filtered Water	
		Maximum	Min.	Aver.	Max.	Min.	Aver.	1 c. c.	1 c. c.	50 c. c.
Dec., 1909	Settled Water	103,000	2,500	34,600	40	0	13	19 days	4 days	10 days
Dec., 1910	River Water	285,000	9,000	83,900	52	1	14	9 days	0 days	2 days

DATA FROM WATER PURIFICATION WORKS—December, 1910.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins. Settling Basin: Period in Hours	Settling Basin Effluent: Turbidity	Settling Basin Effluent: Bacteria per c. c.	Coagulation Basin: Period in Hours	Coagulation Basin Effluent: Turbidity	Coagulation Basin Effluent: Bacteria per c. c.	Parts per 1,000,000 Unpurified Water: Turbidity	Unpurified Water: Color	Unpurified Water: Total Hardness	Purified Water: Turbidity	Purified Water: Color	Purified Water: Total Hardness	Nos. of Bacteria per Cu. Centimeter: Unpurified Water	Nos. of Bacteria per Cu. Centimeter: Purified Water	No. of Deaths from: All Causes	Typhoid Fever	Pulmonary Consumption
Albany, N. Y.	100,253	Hudson River.	16 rapid sand, 8 slow sand	22.3	...	17.8	7	71,500	....	....	....	9	34	89	0+	26	89	79,200	180	208	2	23
Cincinnati, O.	364,463	Ohio River	Rapid sand filter using iron and lime as a coagulant.	45.	3.2	48.0	42	9,100	11	20	3200	110	...	85	0	...	97	32,500	150	547	0	71
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	14.2	0.6	12.	1	14	Combined with the sedimentation.			20	25	396	0	6	107	12,000	2	218	1	23
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	9.1	1.7	6.0	...	....	1.5	....	21	3	2	...	0	0	...	6,300	3	102	2	7
Indianapolis, Ind.	233,650	White River	Modified slow sand filtration.	18.7	...	24.+	8	700	Combined with the sedimentation.			20	21	316	0+	6	319	1,900	38	340	7	30
McKeesport, Pa.	42,694	Yoghiogheny R.	Water softening and mechanical filtration.	3.8	0.5	20.	0	7	Combined with the sedimentation.			0+	0	157	0	0	70	2,400	5	54	0	5
Toledo, O.	170,000	Maumee River	Mechanical filtration.	15.4	2.0	6.	4	310	Combined with the sedimentation.			74	27	...	0	9	...	10,900	87	171	5	...
Torresdale. Pa. (Philadelphia)	———	Delaware River	Slow sand filters.	......	...	......	...	....	....			28	15	49	0	15	49	12,000	71	...	...	...
Youngstown, O.	80,000	Mahoning River	Mechanical filters.	8.3	4.0	3.	20	2,500	Combined with the sedimentation.			48	26	157	0	1	158	32,500	233	...	...	...
Washington, D.C.	348,460	Potomac River	Sedimentation and low sand filtration.	62.8	0.3	96.0	2	900	....			8	0	111	0	0	117	1,950	39	544	5	68

NOTES: The following notes of interest should be added to the data given above.

ALBANY, N. Y.—There are 16 preliminary filters at this Plant, running at an average rate of 86.5 million gallons per acre, requiring 2.1% of Wash Water, yielding an effluent which contained, on an average, 1 plus p. p. m. of turbidity, and 26,000 bacteria per C. C.

CINCINNATI, O.—12 filters were run on an average at this Plant. Each filter has 1400 square feet of Surface, and runs at an average rate of 124 million gallons per acre.

HARRISBURGH, PA.—One of the deaths from Typhoid Fever was that of a tramp.

PHILADELPHIA, PA.—The population of Philadelphia is 1,549,008. The average daily consumption of Water in the city was 208.5 million gallons. There were 2,330 deaths in the city of which 23 were due to Typhoid, and 211 to pulmonary consumption.

The data given in the preceding table show that the bleach reduced the whole numbers of bacteria in a satisfactory manner in each period but that the reduction in numbers of *B. coli* was decidedly more marked in 1910, when the bleach was being added to the river water (charged with carbonic acid) before the quick lime had been applied for water softening. This indicates that the carbonic acid in the river water decomposed the bleach more efficiently, and suggests that when hypochlorite of lime is to be used as a germicide at water softening or coagulation plants it should be added to the raw water.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Massachusetts.*
(*Reviewer.*)

The Supreme Court Decision of Minnesota filed December 3, 1910, seems to be so far reaching and important to sanitarians that our space this month is devoted to that entirely, the following copy being received from Dr. H. W. Hill, Epidemiologist of the Minnesota State Board of Health.

16282–3.

STATE OF MINNESOTA, SUPREME COURT, APRIL TERM, A. D. 1910, Nos. 5-6

DELIA KEEVER, as Adm'x, *Appellant v.* THE CITY OF MANKATO, *Respondent.*

KATE FLANAGAN, as Adm'x, *Appellant v.* THE CITY OF MANKOTA, *Respondent.*

SYLLABUS.

A complaint charged that defendant city negligently allowed the supply in its waterworks system to become polluted with poisonous substances and large quantities of filth and sewage to escape into and saturate its water supply, by reason whereof plaintiff's intestate contracted typhoid fever and died as a consequence.

On demurrer it is held: (1) The municipality was liable for its negligence in its private or corporate capacity, and was not exempt because it was carrying out a governmental function.

(2) Under section 4403 an administrator of a person whose death was due to the wrongful act of a municipality may maintain an action for damages consequent thereon. *Malone v. City*, 40 Minn., 406; *Orth v. Village*, 87 Minn., 207, followed.

Reversed.

OPINION

This is an action for death by wrongful act occasioned by the negligence of the defendant city.

The complaint alleged that defendant, a municipal corporation, negligently allowed waters and the water supply in its water works system to

* State and City Boards of Health and other organizations are requested to send copies of their reports, bulletins, etc., to the above address for review.

become infected and polluted with poisonous substances "and large quantities of filth and sewage, all of which were saturated with the germs of disease * * * * and did carelessly, negligently * * * * permit * * * * filthy, foul and dangerous subtsances, common sewage and other filth to escape into and saturate the water supply;" that by reason thereof the water became imminently dangerous to life and health of which defendant had full notice and knowledge that plaintiff's intestate, a citizen and resident used the water, contracted typhoid fever and died in consequence. The complaint set forth additional facts as the right of the administrator to recover. Defendant's demurrer to plaintiff's complaint was sustained. From that order the plaintiff appeals. It is to be noted that the complaint in the case at bar set forth not a mere action against the defendant to recover damages because the city failed to provide an adequate supply of pure water. The question here is whether the city is liable for, among other things, recklessly causing dangerous substances like common sewage and other filth to saturate its water supply and the wells, mains and appurtenances thereto.

The first essential question is whether the city is exempt because it was carrying out a governmental function, or whether it is liable because it operated the waterworks in its private or corporate function.

The defendant naturally insists that it was performing merely a governmental function. There is ambiguity in that term as used in this connection. It may mean that the operation of waterworks by a municipality is *intro vires* as distinguished from *ultra vires*, or it may mean that such function is public as distinguished from private or proprietary, in which capacity the city may voluntarily assume for business purposes and for its own advantage to conduct certain operations and is held responsible for negligence therein, although work is done ultimately for the benefit of its citizens. Many of the authorities to which defendant refers us properly hold that a city may properly operate waterworks. They have no tendency whatever to determine whether or not the city is or is not exempt in its operation of waterworks.

Defendant also insists that the city can make no profit out of its operation of these waterworks. Doubtless this is in a general way true; at all events it may be here admitted. But the sequence which defendant seeks to draw does not at all follow, i. e., that therefore it should be exempted from all liability from mismanagement. For the city is liable for neglect in connection with its streets, sidewalks, and sewers, from which in their very nature no profit is or can be made. The city operates the waterworks for profit in the sense that it is voluntarily engaged in the same business which when conducted by private persons is operated for profit. The city

itself makes a reasonable and varying charge. The undertaking is partly commercial. It is enough that the city is in a profit making business. "The city is exercising a special privilege for its own benefit and advantage although a portion of the water is used by the city for protection against fire and in promoting the public health." Hammersley, J., in *Horrigan v. Norwich*, 77 Conn. 358. The English authorities regard cities in such matters as "substitutions on a large scale for individual enterprises." Mr. Justice Blackburn in *Mercy Deck Trustees v. Gibbs*, L. R. 1 Eng. & Ir. App. cases at page 107, approving Mr. Justice Mellor in *Coy v. Wise*, 5 B. & S. 440.

Finally defendant insists that it would not be sound policy to open the door and permit actions like the present to be maintained for the reason that as a result the defendant city as well as any other city would be liable at any time to have the same misfortune and would be bankrupted thereby. The assessed valuation of the city is less than $4,000,000. If the city is not exempted from liability it is subject to claims of the same nature as the present amounting to over $10,000,000. Thus the very existence of the city is threatened and the city subjected to total destruction, which could be of no proportionate advantage to the individuals who suffered. It readily suggests itself as an answer to this dark prognostication that the number and nature of these cases does not appear in the record and is not known to the court; besides for the purpose of this case the neglect of defendant is necessarily assumed.

To the defendant, under the law, a number of defenses are available. How conclusive they may be in fact is wholly beyond any conjecture which we can recognize. Accordingly we must regard defendant's figures as purely hypothetical. The question is one of general principles recognized by the law and not of the private views of court or counsel as to what the convenience or necessity of a particular city may dictate under particular circumstances. The general experience of public and private waterworks is that ordinarily their operation involves no such financial disaster as defendant portrays. It is obvious that a sound public policy holds a city to a high degree of faithfulness in providing an adequate supply of pure water. Nor does it appeal why the citizens should be deprived of the stimulating effects of the fear of liability on the energy and care of its officials; nor why a city should be exempt from liability while a private corporation under the same circumstances should be held responsible for its conduct and made to contribute to the innocent persons it may have damaged. As Elliot, *J.*, said in *East Grand Forks v. Luck*, 97 Minn. 373: "When the municipality enters the field of ordinary private business, it

does not exercise governmental powers. Its purpose is, not to govern the inhabitants, but to make for them and itself private benefit.

As far as the nature of the powers exercised is concerned, it is immaterial whether the city owns the plant and sells the water, or contracts with a private corporation to supply the water. It is not in either case exercising a municipal function. * * * * * When a municipality engages in a private enterprise for profit, it should have the same rights and be subject to the same liabilities as private corporations or individuals." See *Powell v. Duluth*, 91. Minn., 53; *Furgeson v. Doran*, 103 Minn., 43; *State ex rel. v. Bd. Water & Light*, 105 Minn., 472. Thus in *Wiltse v. Red Wing*, 99 Minn., 255, a city operating the waterworks was held liable for water escaping from an embankment under the rule, in *Rylands v. Fletcher*. "For," said Start, *C. J.*, "although a municipal corporation, it was engaged in the business of supplying water to its inhabitants for profit, an undertaking of a private nature."

This is undoubetdly the general rule. See *Piper v. Madison*, 122 N. W. 730; *Park Commissioners v. Common Council*, 28 Mich. 229; *Baily v. Meyer*, 3 Hill 531; (as to the reasonsing of this case, however, see *Darlington v. The Mayor*, 31 N. Y. 164-198. Cf. *Messane v. Mayor*, 160 N. Y. 123, *Aldrich v. Tripp*, 23 Am. 434; *Ill. Trust Co. v. Kansas City*, 76 Fed. 271, 282; *Winona v. Betset*, 169 Fed. 321; *Judson v. Wingstead*, 68 Atl. 999; *Wagner v. Rhode Island*, 21 L. R. A. 522; *Esberg v. Portland*, 43 L. R. A. 435; *Brown v. Salt Lake City*, 14 L. R. A. n. s. 619; *Horrigan v. Norwich*, 77 Conn. 358; *Syracuse v. Springfield*, 174 Mass. 430; *City of Chicago* v. *Selz*, Schwab & Co., 202 Ill., 545; *Philadelphia v. Gelmarlieu*, 71 P. 141.) *Springfield Fire & Marine Ins. Co., v. Village of Keeseville*, 42 N. E. 405, *Asher v. Hutchinson, etc., Co.*, 61 L. R. A. 58.

The cases in which a city has been held responsible or irresponsible for damages by fire consequent upon an adequate supply of water are in a class of cases by themselves. From many points of view the rule holding the city liable for its negligence is not consistent with the rule there announced. The law does not undertake to achieve the impossible. As was said in *Gould v. Winona Gas Co.*, 100 Minn., 268 pp. 264: "It is evident that the ultimate justification of the inapplicability of the rule (there in question) lies in the controlling regard of the common law not for doctrine but for common sense. Its paramount object is to work out substantial and not physical justice. Its just claim to distinction is to be found not in the logical consistency of its applied theories but in the practical wisdom with which it has adapted its rules to varying subject matter and conditions."

Defendant also urges that in no case has the city been held liable for negligence in the operation of its waterworks unless the act involved a

trespass, or an invasion or a direct property right. Thus water escaping from a city reservoir runs onto another's property and does damage; this is trespass and there is liability. *Wiltse v. Red Wing*, (supra). But if the escaping water should do damage to a person and a public highway there would be no trespass but the law would recognize liability. Liability of the city is recognized in the case of streets and sidewalks which cannot properly involve trespass. Nor has defendant shown any reason for imposing liability, in the case of trespass or the breach of insurance of safety which does not logically apply to cases of negligence. On general principles liability for negligence is more just and more generally recognized because it is based upon culpability.

(2) The question then arises whether upon the assumption that plaintiffs intestate could have maintained an action against the defendant city had he lived can his executor maintain an action under our statutes. Section 4403 revised statutes provides "when death is caused by the wrongful act or omission of any person or corporation the personal representative of the decedent may maintain an action therefor if he might have maintained an action had he lived, for an injury caused by the same act or omission." Defendant has pressed upon us very earnestly that "corporation" as here used refers only to private corporations, (See Sec. 2839, revised laws 1905) and does not include municipal corporations. The matter is not de novo in this state. In *Malone v. City of St. Paul*, 40 Minn., 406, and in *Orth v. Village*, 87 Minn., 237; the administrators of deceased persons were allowed to pursue the statutory action against the city for negligence causing death. Such has been the settled construction in practice for many years. We do not feel at liberty to change that construction.

Reversed. JAGGARD, *J.*

The above was copied from a certified copy of the Clerk of the Court, at the office of the Epidemiological Division of the Minnesota State Board of Health, January 5th, 1911, by M. S. Robertson.

Further Developments in the Ohio State Board of Health. Since the first of January the following resignations from the staff of the Ohio State Board of Health have occurred: Mr. A. J. Slack, Chemist; Mr. L. V. Parker, Bacteriologist; Mr. Edgar Parker, Laboratory Assistant; Mr. R. W. Ferris, Assistant Engineer; Mr. C. E. Shockey, Correspondence Clerk. This leaves twelve of the original staff of twenty-seven. Mr. Slack has accepted a position with the Lederle Laboratories, New York City, and Mr. Parker is now Assistant Bacteriologist of the North Dakota State Board of Health Laboratory.

The Board has appointed in the interim a stenographer, a messenger, a laboratory helper and a clerk, and has requested the legislature to approve an appropriation of $1500.00 for an epidemiologist and $500.00 for the services of a pathologist.

In the Columbus Dispatch for February 25th appears the following: "A scheme is being hatched to inject politics into the State Board of Health. * * * It is proposed to reorganize the Board and appoint a Democrat to succeed Dr. C. O. Probst, of Columbus, who has filled the position of Secretary for a quarter of a century. Saturday, Mr. John W. Hill, of Cincinnati, one of the new Democratic members of the Board secured an opinion from Attorney-General Hogan as to the status of Dr. Probst's position. He wanted to know if he should be regarded as a public officer or as merely an employee of the Board, and subject to removal for cause. The ruling of the Attorney-General is * * * that he is an employee of the Board. It is apparent that this information was asked for to learn if there were any barriers in the way of changing the office, so that a Democrat could be put into it."

The Cleveland Medical Journal in its editorial columns (February number, p. 145) reviews the situation in detail.

Dr. R. H. Grube, Xenia, Dr. Hasencamp, Toledo, and Dr. H. T. Sutton, of Zanesville, have recently been appointed members of the Ohio State Board of Health by Governor Harmon to fill the three vacancies existing on the Board. It is evident that the future of the Department depends much upon the attitude of these three men.

B. R. R.

ANNOUNCEMENTS AND COMMUNICATIONS.

Bacteriological Museum and Bureau for the Distribution of Bacterial Cultures. The Department of Public Health at the American Museum of Natural History has equipped a laboratory to serve as a central bureau for the preservation and distribution of bacterial cultures of both pathogenic and non-pathogenic organisms, and particularly of types of new forms and varieties. It is hoped that the laboratories of Medical Schools, Colleges, Boards of Health, Agricultural Experiment Stations, etc., and those engaged in biochemical work of all sorts, will furnish the Museum with cultures at present in their possession, and the laboratory is now ready to receive and care for such cultures. Only organisms which have been identified and which have a definite history are desired as a rule; but in the case of rare species, like the organisms of certain tropical diseases, this rule may be departed from. The laboratory cannot undertake to maintain more than fifteen different strains of any particular form. Types of new species and varieties are particularly desired at the present time and as they may be isolated in the future.

The laboratory plans also to keep on file descriptions of bacterial species in print or arranged in the form of the standard card and will be grateful for copies of any such descriptions.

Descriptions filed in the Department will be carefully preserved and living cultures will be kept in good condition, so far as possible, and will be supplied at all times without charge to Corresponding Laboratories and furnished so far as possible and with a reasonable charge to schools and other institutions which may desire cultures. The laboratory, of course, cannot undertake to keep on hand difficultly-cultivable bacteria, such as can be maintained only for a few weeks after isolation from the body; neither can it at present supply virulent cultures which rapidly lose their virulence under laboratory conditions. It should, however, be able to furnish cultures of organisms of all the ordinary types, which can be maintained under cultivation. Pathogenic forms will be sent only to properly qualified persons.

AMERICAN MUSEUM OF NATURAL HISTORY,
77th Street and Central Park West, New York.
Department of Public Health.

BOOK REVIEWS.

Thirty-ninth Annual Report of the Local Government Board 1909-10. Supplement, Report of the Medical Officer. 7 s. 6 d.

These reports have a steadily increasing value and should be in the hands of everyone interested in epidemiological work. The one referred to is of special interest. A new departure in this report is the introduction of data and discussion concerning the prevalence of contagious diseases in England and Wales. The subject of infant mortality is again briefly considered and a new and interesting diagram presented illustrating the correlation between mortality in infancy and at later ages. The diminished virulance of scarlet fever is illustrated by the fall in the mortality from 72 per 100,000 in the years 1871-80, to 11 in the years 1901-8, and by the case fatality in the London hospitals, which fell from 12.1 to 2.4. Isolated outbreaks of a severe type do, however, continue to occur, and there was one such in the Isle of Portland, consisting of 23 cases with 11 deaths. Several milk outbreaks of scarlet fever are reported, in one of which 25 persons sickened out of 48, who, on a single occasion, partook of the infected milk. A small diphtheria milk outbreak also is reported.

In the decade 1871-80, the mortality per 100,000 for typhoid fever was 33, which was about what it is in American cities at the present time. In the years 1901-8 it had been reduced to 10, which shows what we ought to do here. An excessive prevalence of typhoid fever still persists in some parts of England, notably in the County of Durham. The conditions in this county have been very thoroughly reported upon by Dr. Wheaton. He finds that little or no typhoid fever is attributed to water. But it is the same old story of filthy and overflowing privy vaults, defective scavanging, flies and absence of soap and water. Although the county as a whole has a pretty continuously high death rate from this disease, its local distribution is very irregular. This indicates that there is no persistent endemic infection, but that the disease lights up here and there in filthy neighborhoods, as infection is introduced from without. Dr. Wheaton connects an excessive prevalence with dry seasons.

Shell fish are suggested as a probable source of typhoid fever in a number of instances, and 13 cases are said to have been due to the eating of mussels collected from the bottom of a ship in dock. At North Ormsby, Johnstone found that 16 of 62 cases had eaten raw mussels within 5 to 21 days of their illness. A house to house investigation of 827 persons without typhoid fever, showed that less than eight per cent had eaten mussels during the whole of the summer. This is less than a third of the percentage of mussel eaters among typhoid fever cases.

Among other important papers in the report is one by Savage on the examination of 64 samples of prepared food, and 18 of brine for the presence of Gaertner's bacillus. None were found. He believes that they only come from diseased meat. There are also papers on the Bacterial Measurement of Milk Pollution, Types of Cells in Phagocytosis, and the Chemical Aspects of Epidemic Diarrhea.

Scholberg and Wallis, the writers of the last paper, find a correlation between a high bacterial count in milk, and the presence of certain peptones and peptone like bodies which produce an irritating affect upon the intestines.

The most important paper in the report is one by J. C. G. Ledingham, on Typhoid Carriers. This is by far the most important and comprehensive contribution to this subject which has yet appeared. It is divided into fifteen chapters and contains a copious bibliography. The author considers the frequency of carriers, their infectivity, pathogenesis, auto-infection, treatment, diagnostic methods, the immunity of carriers, and their control, and many other topics.

C. V. Chapin.

Bamberg, Fr. Über Grundwässerenteisenung mit spezieller. Gesund. Ing. 33, 147-51, 217-21, 240-43. Chem. Zentr. 1910. I. 1853.

This is a continued article, the report of a lecture before the Polytechnic Society in Berlin, discussing the physics, chemistry and engineering of the various deferrization processes, especially of the so-called closed (pressure filter) systems. The author describes the different conditions in which iron exists in ground water, paying special attention to the organic compounds. Not only is iron combined with humic acids, but the hydrate is held in solution by the presence of organic matter. He describes the change of the soluble iron by oxidation into the hydrosol and later into the hydrogel form, and states that certain salts and compounds aid while others hinder this transformation. The favoring substances are those which form hardness in water, which do not include, of course, contact action which is effective when water containing iron and oxygen is passed through rieslers or filters, nor the beneficial effect produced by an accumulation of hydrate upon the filtering material. The chief retarding agents are CO_2 and dissolved organic matter. Sometimes, no matter how intensive the aeration, the organic matter will keep the hydrosol in suspension or solution. All efficient processes depend upon the oxidation of the dissolved iron, the formation of the hydrogel, and the removal of the latter by filtration. Oesten has noticed the re-solution of iron precipitated out in distribution systems supplied with water from which the iron, but not the CO_2, has been removed. The author states that once oxidized the hydrate in the pipes cannot be redissolved, but on the other hand, if CO_2 be present the metallic iron in the pipes may be dissolved, and if oxygen be present this may be oxidized. In a ground water there is usually a struggle between the O_2 and the free CO_2 and of the two factors the O_2 is always the stronger. Ground waters containing free CO_2 stored in bottles frequently show the presence of precipitated hydrate if they contain a small amount of dissolved oxygen. The author mentions the closed systems and remarks upon the necessity for the presence of oxygen in order to obtain a complete removal of the iron. It is as necessary to aerate the water in closed as in open systems. He describes the two common open systems, namely, the Oesten, where the water is sprayed on to a sand filter, and the Piefke, where the water is aerated by passage downwards through a so-called riesler or scrubber and afterwards filtered through sand. The same conditions must be obtained in closed filter—sthat is O_2 must be admitted to the water and CO_2 removed.

The author mentions many ground waters containing large amounts of organic substances, part of which are in combination with the iron. Many of these waters contain nitrogen and in some cases phosphoric acid. This would be expected from their association with peat bogs and fossil deposits. Although it cannot be proved analytically, many waters contain reducing agents which have a stronger affinity for the iron than does the oxygen of the air. In such cases the author finds that ozone is the most efficient, though perhaps not the most economical, means of purification. H_2O_2 can be used but it is eight times as expensive as O_2.

The presence of sodium chloride in the amounts usually present in drinking water has no apparent effect upon the precipitation of the iron. Waters containing compounds of iron and mineral acids—for example, the drainage water from mines—can be purified best by the addition of chemicals, usually lime and soda ash, aided at times by sulphate of alumina and ferrous sulphate. The closed systems are described. The earlier types of these were badly constructed and did not produce the desired effects. They have been perfected, however, and Bamberg states that he has used closed filters for the purification of water containing 25 mg. Fe per L., successfully. Many of these plants depended for the oxidation of the iron upon air admitted to the pump suction. This was uneconomical and inefficient, largely because the CO_2 was not removed. Many such plants succeeded because the amounts of iron to be removed were small. In some cases, where H_2S was present, the filtered water possessed an objectionable odor. Most of the old types of closed filters were filled with shavings or "excelsior." Where inorganic matter (iron ores, gravel, sand, etc.) was used, the efficiency was much less. The wood filling became foul frequently and had to be removed and sterilized. Furthermore wood fibres passed the filters and accumulated in the distribution system. Many attempts were made to utilize the oxides of the metals for filtering material with the mistaken idea that these oxides, especially tin oxide, would act as carriers of oxygen and cause precipitation of the iron. Subsequent experiments have shown that the oxides take no part in the chemical reaction. The wood filling of the filters frequently decomposed and disinfectants were suggested and used, but the author condemns this practice. Either the disinfectants are soluble in water and soon wash out, or if not, give a disagreeable taste and odor to the water.

The author describes the Breda system and believes that it possesses distinct advantages over the other closed deferrization plants. The apparatus comprises mixing and reaction chambers and filter. The reaction chamber and filter are contained in a tall cylinder, the mixing chamber being attached to one side of the latter. Aeration is accomplished by forcing the air into the water. The mixed air and water pass through the mixing chamber and thence at a high velocity through jets and baffle plates at the bottom of the reaction chamber, which latter is filled with medium sized broken porcelain. The water passes upward through the porcelain and thence downwards through a central pipe to the mechanical filter placed beneath. The whole apparatus is self-contained. The excess of air is vented automatically. This also carries away any odorous gas. The loss of head in the apparatus can be raised from 10 to 15 pounds before washing is necessary. The reaction chamber is cleaned by flushing, the filter by washing with reversed currents. The reaction chamber removes most of the iron, leaving the filter to remove the last traces and also any Mn. From 1% to 1.3% of wash water were required in the two cases cited from practice. The excess of accumulated hydrate, which is of course a most favorable aid to the process, is washed out from the reaction chamber once in from 3 to 6 weeks.

Without agitation the filter sand becomes incrusted with hydrate. In the Breda system rakes are used to agitate the sand during washing. A complete description is given of a large plant having a capacity of 75,000 gallons per hour, installed at the Zoological Gardens in Berlin. The advantages and disadvantages of the closed or pressure systems are similar to those for pressure filters used for water purification. Aeration by this process may be more expensive, especially as the author states that a volume of air equivalent to from 5% to 50% of the volume of water, may be necessary to effect a completed removal of the iron. From a hygienic

standpoint the system has many advantages, especially as the water is not exposed from well to tap. Introduction of air, however, may infect the water with bacteria. This can be prevented by filtering the air. Ordinarily the filter material is sterilized before using.

Regarding the permissible limits of iron in filtered water, the author states that from 0.1 to 0.2 parts per million will not cause turbidity of the effluent. Some water, however, will hold 0.3 parts permanently in suspension. In some industries, notably bleacheries, it is essential that no iron be precipitated from the water after filtration, although good results have been obtained with a water containing as high as 0.3 parts of iron per million provided it was held in solution throughout the whole of the bleaching process.

Not only is iron necessary for the growth of Crenothrix, Leptothrix, Gallionella and other thread fungi, but also organic matter. Manganese in small amounts usually accompanies iron and is removed with it. The reaction is slower, however, and more contact and time are necessary for its removal. When present in large amounts its removal is extremely difficult. For this purpose the use of artificial zeolite "Permutit," known as the Gans process, also the use of potassium permanganate, is not considered practicable. Usually it is more economical to employ lime rather than the expensive "Permutit"; this costs 5c. a pound, is slightly soluble in water, does not resist abrasion well and entails considerable expense for its regeneration and renewal. The author prefers to depend upon intensive aeration, agitation and contact, which have been sufficient in all cases within his experience to effect a removal of both iron and manganese.

R. S. Weston.

Department of the Interior, U. S. Geological Survey Water Supply Paper No. 255. Underground Waters for Farm Use by Myron L. Fuller.

This paper is a very comprehensive study of the different types of private water supplies commonly used in this country. There has long been a need for the compilation of this material in the clear and concise form presented by the author. While this paper relates primarily to the types of supplies common to farms, yet much of the data recorded is of general application. The report takes up the underground sources of water supply, describing in detail, the water-bearing formations, the occurrence of water in the formations and the relative safety of the materials. A description is given of all the common sources in use, namely, lakes, ponds, streams, springs, wells and cisterns. The reasons for the use of the different sources in various sections is discussed. The author then takes up the underground types individually, describing their protection which includes a very detailed description of construction. Under springs the different kinds are named, possible sources of pollution mentioned and the means of protection described. Wells are discussed under their respective types. The location, methods of construction, common sources of contamination, protection from pollution and other information relating to such supplies is given in detail. The subject of cisterns is dealt with at some length furnishing information regarding their advantages and disadvantages, location and construction.

The following sentence is quoted from the introduction of the paper. "Typhoid fever is now almost universally believed to be transmitted solely through drink and food taken into the stomach, and is especially liable to be communicated by polluted water obtained from shallow wells near spots where discharges of typhoid patients have been thrown upon the ground and subsequently carried down through the soil

and into the wells, and it is doubtless principally this fact that makes the disease so common in farming regions." In this sentence the author makes it appear that the shallow farm well is the principal factor in making typhoid so common in farming regions. The writer has had occasion to investigate considerable rural typhoid and believes this statement too broad for general application. The results of detailed investigations in the state of Minnesota have brought out the following facts.

(1) The water supply is usually not the source of typhoid upon the farm.

(2) The more extensive outbreaks upon farms are associated with polluted surface supplies.

(3) The condition of a water supply usually represents the sanitary condition of the farm and therefore indicates the potentiality of a typhoid outbreak. Therefore, with general unsanitary surroundings the means of transmission are multiplied from every source.

In the forthcoming biennial report of the Minnesota State Board of Health, Dr. H. W. Hill, Director of the Epidemiological Division, draws the following conclusions from his recent studies "that contact, flies and milk, and seldom water are the cause of rural typhoid in Minnesota." A common tendency of the past has been to blame water almost indiscriminately for typhoid when other such factors, frequently overlooked, are more probably to blame.

H. A. Whittaker.

A Manual of Personal Hygiene by American Authors. Edited by Walter L. Pyle, A. M., M. D. Fourth edition revised and enlarged. Philadelphia and London: W. B. Saunders Company, 1910.

That this book has run through four editions and three reprintings within the space of eleven years is sufficient attestation to its worth and usefulness.

The preface to the first edition states in part: "the object of the manual is to set forth plainly the best means of developing and maintaining physical and mental vigor." That this has been accomplished successfully without recourse to any unnecessary flow of technical language is very evident to anyone who takes up the volume; at the same time there is an entire absence of presentation of fads or fantastic theories at variance with the best accepted beliefs of the medical profession of today. Despite the fact that the book has been written by some nine different authors, the defects of divergent individuality of expression have been practically deleted, thus giving to the work a most desirable smoothness of composition throughout.

The introductory chapter forms part of an admirable address on the "Teaching of Hygiene in the Public Schools" given by the editor, Dr. Pyle, at the meeting of the American Academy of Medicine in Washington in 1903, and it well serves to place before the lay reader the great necessity for a substantial grounding in the facts that underlie healthy physical welfare and a proper system of personal hygiene.

The other chapters of the manual are contributed by the editor and eight other well-known members of the medical profession who write upon the subjects of their individual specialties. These topics are ably discussed under the following heads: Hygiene of the Digestive Apparatus; Hygiene of the Skin and its Appendages; Hygiene of the Vocal and Respiratory Apparatus; Hygiene of the Ear; Hygiene of the Eye; Hygiene of the Brain and the Nervous System; Physical Exercise; The Body-posture; Domestic Hygiene; an Appendix dealing with the Pulse, Respiration, Baths, Massage,

Accidents and Emergencies, Poisoning, a Table of Poisons and Antidotes, and a Glossary of Terms used in the Text.

Upon comparing this with the third edition, one finds that the only new material incorporated, (preface notwithstanding), is a chapter upon body-posture by Dr. Joel Goldthwait, of Boston, in which is adequately described the evils accruing to the individual from the formation of bad habits in maintaining a poor carriage of the body, together with recommendations as to the best means to be adopted in overcoming them, particularly in the growing child; and it is noticed that the chapter on Domestic Hygiene has two sections devoted to a discussion of the special methods of combatting diphtheria and scarlet fever.

No book is without its faults, and this manual in a small way is no exception to the rule. It is to be regretfully noted that in making the revision, the editor did not see fit to write a proper preface to this edition, rather than feebly revamping the one that did service for the preceding edition, inasmuch as the statements made then do not now fit the facts as found.

Another error of revision is to be found in the statement that the author of the chapter on Physical Exercise, Professor G. N. Stewart, is a member of the faculty of the University of Chicago, whereas he has been connected with that of Western Reserve University since the latter end of 1907.

In the chapter on Domestic Hygiene the same error that appeared in the previous edition on page 391, is carried over to page 409 of the present one, wherein it is stated that the *flea* is concerned in the transmission of the spotted fever of Idaho and Montana instead of the tick, *Dermacentor andersoni*. In this same section of the book, stronger criticism might have been used against the employment of domestic filters, and a little more space devoted to the discussion on a hygienic milk supply.

On the article on The Skin and Its Appendages, the writer in speaking of poisonous hair dyes might have mentioned "Mrs Potter's Walnut Tint Hair Stain;" this and another so-called "harmless" hair dye, "Eau Sublime," have been found on analysis to contain a poison, paraphenylen diamin, and according to the Journal of the American Medical Association* the former preparation has been concerned in causing twenty-four cases of poisoning by this substance.

One of the unintentional humors of expression of language is seen on page 117, line 19 from the top of the page, where the writer, in speaking of the excessive use of the voice, warns his reader thus: "no one should sing until the larynx becomes fatigued."

In making a comparison of the publishers' statements, to be found on the reverse sides of the title pages of the third and the fourth editions of the manual, referring to the times of printing, revision, electrotyping, copyrighting, etc., the inquisitive reader is struck with the great divergence of dates mentioned therein.

In appearance the book is attractively gotten up, neat, well printed, and remarkably free from typographic mistakes; numerous and suitable half-tone reproductions and drawings sufficiently illustrate the text.

The reviewer takes pleasure in recommending the volume to the laity and others interested in the subject of personal hygiene.

NORMAN MAC LEOD HARRIS.

The University of Chicago.

* Jour. Am. Med. Assoc., 1910, lv, p. 1662.

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EDITORIALS

DISPOSAL OF GARBAGE AND OTHER REFUSE.

THE disposal of city refuse is a broad subject, involving sanitary, engineering, financial, and aesthetic features. Topography and geographical position affect it in many ways. Character of population and of industry, season, and amount and quality of fuel exert a marked influence. The cost of labor, the length of haul, and the quantity of materials to be handled must be considered.

Cities on the coast have for years shipped garbage out to sea and dumped it, the winds and tides scattering it. Many smaller communities, surrounded by farming lands, give large quantities of garbage to the farmers for fertilizer or to feed to hogs. In some cases the officials buy land and bury garbage. In some cities a contract is made for the collection of all waste materials which are hauled to some out-lying district, the cans, rags, bottles, etc., sorted out and the residue burned or buried.

If a city spreads uniformly in all directions and has facilities for railroad or water transportation, the process of removing the collected garbage can be carried on at much less expense than if the city stretches out in one direction or lies in a valley between steep hills.

The garbage collected varies in composition with the season of the year. In the winter people use fewer fresh vegetables, and the household waste is then smaller in volume and charged with a rather large percentage of nitrogenous and fatty matter, but in the summer time the people use such numbers of fresh vegetables that the pea pods, melon rinds, and corn husks accumulate in great bulk. The percentage of meat and fatty compounds is then small. As the price of garbage sold for fertilizer depends to a large extent upon the amount of nitrogenous matter and fats contained, the bulky summer product is of less value per wagon load than the more condensed winter waste. Problems of an entirely different kind have to be met in the proper disposal of other refuse, such as ashes, paper, etc. A common way of getting rid of such material is incineration, but in that case the accumulated mass must have enough combustible matter in it to burn of its own accord, in order to be economical. In some cities where hard coal is used the household ashes may carry 20% to 25% of unburned coal with the result that the refuse will burn of its own accord in furnaces. The heat thus generated together with that from waste paper can be used to dry garbage so that it, too, will take fire, but in towns where soft coal is used for fuel, the ashes from houses contain little combustible matter and coal must be added at a large additional expense.

City refuse contains much material having a marketable value. For instance the "fertilizer stock" from garbage when properly prepared is worth $10.00 a ton, the grease, $100.00 a ton, newspapers are worth $8.40 a ton; rags, $10.00 a ton; tin cans, $90.00 a ton, etc., through a large variety of articles. Such prices have looked so attractive to inventors and promoters that they have developed machinery for extracting saleable products in order to cheapen the cost of disposal of city wastes. In some cities, New York for instance, contractors have offered to pay the city large sums for the privilege of utilizing the city refuse.

The destruction and disposition of waste products has been left for the most part in the hands of private parties, especially in the smaller cities. Many of these companies have failed, partly, perhaps, because they took the contracts to find a market for their machinery which afterward proved to be inadequate or ill adapted to the work, partly because politics and bad management crept in, and partly because the quantity of refuse available was too small for economic handling.

Where the population produces less than 50 tons of garbage in 24 hours the margin of profit is small or nil. Consequently, if large sums must be paid for patented machinery the plant cannot be made to earn a surplus. For such reasons small plants are likely to be "Proprietary."

If, however, the character of the garbage and refuse is favorable and the quantity large, cities can erect and operate disposal works on a basis that will pay expenses and earn a good surplus. Two general types of plants are popular today. In one—the incinerator type—all sorts of garbage and refuse composed of ashes, wood, paper, rags, and other combustibles, are fed into crematories and burned. There are at least two sources of revenue from such a plant—HEAT which, when applied to boilers, may produce power, and CLINKER which can be used for building material. The advocates of this system claim that incinerators can be located in the heart of the business district without creating a nusiance or injuring neighboring property. This does not produce revenue directly, but it does save money by shortening the "haul", thereby making the collection less expensive. Plants of this kind, built recently in Seattle, Milwaukee, etc., have relieved conditions which formerly were very bad.

The second type of garbage disposal works is commonly known as the reduction method. By this process the sorted garbage is passed through a series of steam cookers, rollers, etc., and by reduction processes, the corn husks, scraps of meat, dead animals, and other nitrogenous matters are converted into "fertilizer stock," and the fats into "soap stock." Plants of this kind are being run at Cleveland, Buffalo, and Columbus, Ohio. The Cleveland plant is said to have paid all expenses and cleared $10,000 in a single year. The Columbus plant, started in July, 1910, has netted $2,000 a month for the past six months.

There is one city in America, Atlanta, Ga., which has started upon a system of collecting manure as well as other wastes. The engineer in charge of the Columbus, Ohio, garbage reduction plant has recently made a report to the city council in which he states that "the value of manure from a fertilizing standpoint amounts to $3.00 to $4.00 per ton."

Little has been said so far in regard to the hygienic side of these matters, but it has been proved conclusively at several places that the disposal of garbage and refuse can be conducted upon a thoroughly sanitary basis. The removal of such materials is a branch of public health work which should be required by the citizens of every community for their own comfort and self protection.

WM. R. COPELAND.

American Public Health Association

REPORT OF COMMITTEE ON EDUCATION OF THE PUBLIC AS TO THE COMMUNICABILITY AND PREVENTION OF GONORRHOEA AND SYPHILIS.*

By DR. G. M. KOBER, Chairman,
Washington, D. C.

At the meeting of the American Public Health Association held at Richmond, Va., in October, 1909, a committee was appointed to consider and report upon the best method of educating the public with respect to the communicability and prevention of gonorrhoea and syphilis.

The sociologic and economic importance of these diseases have long since been appreciated by members of the medical profession and intelligent laymen, especially those who have witnessed the sad effects among the inmates of hospitals, prisons, almhouses, asylums for the insane, the blind, etc. In 1858 a most intelligent and painstaking study was made by Dr. Wm. W. Sanger, Resident Physician of Blackwell's Island, under the auspices of the Governors of the Almshouses of the city and county of New York. The following paragraph from the introduction is reproduced, for it is as applicable now as when first indited by his graceful pen:

"Hitherto reticence has been the policy. This position has been held too long, for it is false in principle and injurious in tendency. The day has arrived when the shroud must be removed, when the public safety imperiously demands an investigation into the matter; when those who regard it as a small wrong may have their attention directed to its real proportions. * * * * * A small matter it decidedly is not. * * * * * * Nor is it unmanageable except when concealed. Stripped of the veil of secrecy which has enveloped it, there appears vice arising from an inextinguishable natural impulse on the part of one sex, fostered by confiding weakness in the other; from social disabilities on one side and social oppression on the other; from the wiles of the deceiver working unsuspecting credulity and finally from the stern necessity to live.

Dr. Swarts, the Secretary of the State Board of Health of Rhode Island, in a public address delivered at Providence, May 20, 1910, declared:

"In our Puritanical Prudence we have been taught not to talk of certain diseases, which now gnaw at the very fundamentals of society. When we have tried to study such diseases we have met with the rebuke that we were acting out of morbid curiosity * * * * * * and any one who has tried to call attention to this evil has been discredited as a faddist looking for notoriety.* * * * * * "

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

Professor Fisher, of Yale, the author of the Report on National Vitality and a member of the Commission for the Conservation of Resources, concludes the section on Syphilis and Gonorrhoea as follows:

"Thanks to the efforts of a few farsighted men like Dr. Prince A. Morrow, Professor C. R. Henderson and Mr. Edward Bok, these subjects are being given some of the publicity they deserve. Reticence on these subjects is justified only so far as it makes for youthful innocence. But ignorance is not innocence; on the contrary, it is the surest road to guilt."

STATISTICS OF VENEREAL DISEASES:

The absence of accurate statistics in venereal diseases in civil life is very much to be deplored, for if we wish to approach the subject from a scientific point of view it is extremely desirable that we should collect accurate morbidity statistics on the prevalence of these diseases. Our present mortality statistics of these diseases are also woefully defective, simply because the attending physician prefers to spare the feelings of the friends of the deceased by assigning the terminal causes of death, which will be found in an endless number of diseases, and ignoring the primary cause altogether. Compulsory notification is exacted in Denmark, the privacy of the patient being safeguarded by a number. According to Dr. Parkins, the City of Detroit has placed syphilis and gonorrhoea on the list of notifiable diseases.

"These reports are made by number (not name) accompanied by the physician's statement of the facts about the source of infection. The City thus provides its health department with the information required to investigate outbreaks of these diseases, just as all other communicable diseases are investigated."

This measure alone is not sufficient to control these diseases, but without it no other measure can succeed.

In a gathering of this character, we need not emphasize that an accurate basis of facts lies at the very foundation of hygiene as of all exact sciences. We all agree that in our combat with communicable diseases it is absolutely necessary to locate the sources of infection, and that we can never hope to stamp out the so-called "germ diseases" unless we stop the dissemination of the germs. In this connection it should be understood that however encouraging our efforts to diminish the ravages of tuberculosis may have been in the past twenty years, complete success is only possible by prompt diagnosis and compulsory notification, i. e., locating the source of infection, and by the practical application of the principles of preventive medicine, and this is equally true of sexual diseases.

The ethical objections which were advanced against compulsory notification in tuberculosis will be urged even with greater vehemence in this

class of diseases. All these objections, however, fall to the ground when the public understands that sexual diseases are a menace to public health and the records of the health office need and should not be disclosed except to public officials. We are confident that education will create sufficient public sentiment in favor of enlightened preventive measures. In the meantime the spirit of the resolutions adopted at the second International Congress on Syphilis held in Berlin should guide us in the solution of the problem, viz.: "The Public must be taught that instead of being ashamed of these diseases and not fearing them, it need not be ashamed of, but must fear them."

MILITARY STATISTICS INDICATIVE OF THE PREVALENCE OF VENEREAL DISEASES IN DIFFERENT COUNTRIES.

While we have no reliable statistics of venereal diseases in civil life, an approximate idea may be gotten by a study of military statistics, and the collective investigations of a few competent commissions.

Lieutenant-Colonel Jefferson R. Kean, of the Medical Department of the U. S. Army and Surgeon Charles N. Fiske, U. S. Navy, have kindly supplied this committee with the following data:

ADMISSION RATES PER 1,000 OF MEAN STRENGTH.

	Year	Syphilis	Chancroids	Gonorrhoea	Total venereal
United States Army..	1909	30.45	30.77	135.77	196.99
United States Navy..	1909	26.49	28.23	105.11	160.40
Japanese Navy.......	1907	.....	.....	......	139.75
British Navy........	1908	37.46	17.87	67.16	122.49
British Army........	1908	35.1	28.23	40.7	75.8
Spanish Army........	1907	11.6	27.84	28.4	67.8
German Navy.......	1908	17.3	9.5	36.4	63.2
Russian Army.......	1907	17.7	12.2	30.2	60.1
Austrian Army.......	1907	16.0	10.1	28.1	54.2
Japanese Army......	1907	10.1	10.4	17.1	37.6
Belgian Army........	1907	6.2	.....	19.99	26.1
Dutch Army.........	1905	4.6	.....	17.00	21.6
Prussian Army.......	1907	4.4	2.1	12.2	18.7
Bavarian Army......	1907	3.3	0.97	10.9	15.1

It is a lamentable fact that the United States and Great Britain, two typical Anglo-Saxon nations, should lead all other armies and navies in the prevalence of venereal diseases.

We do not believe that our population is less virtuous than that of foreign countries, but are inclined to the opinion that this undue prevalence is largely if not entirely due to the fact that the sentiment in these two countries both in and out of the profession is strongly against recognizing the evil, and therefore has not been made a subject of popular education. As a result of criminal ignorance and neglect on the part of the public the admission rate for this class of diseases in the United States Army is on the increase and is now ten times greater than in countries where serious attention has been paid to the consideration of the problem. Surgeon General Rixey of the U. S. Navy in his Annual Report for 1909, tells us that during 1907 this class of disease, if applied solely to the force afloat, "would have operated to render entirely inactive for over a month three battleships with a complement of 1,000 officers and men each." During the year ending December 31, 1908, there were treated in the U. S. Army 11,113 cases in a total of 72,441 men. On page 57 the Report of the Surgeon General says: "Taking all of the venereal diseases together with their results, this class of infections continues to increase, as might be expected of any contagious disease against which the sanitary authorities take no measures of isolation or prevention." The number of sick days for venereal diseases in the U. S. Army for 1909 would represent 971 men as constantly sick, nearly the strength of a regiment; 122 men were discharged on account of syphilis and 84 on account of gonorrhoea.

It may be contended "that enlisted men of the Army and Navy are not representative of our civil population," but let us not forget, as pointed out by Surgeon Fiske, "that the mentality, general morale and station of the enlisted personnel of the Navy has steadily improved during the past ten years, the years of great expansion of the service * * * * that the source of supply of our 15,000 first enlistment recruits and the destination of a similar number of men discharged each year is the civil population." The truth of the matter is that the enlisted men of the Army and Navy are picked men—the majority are recruited from the rural districts and in point of virtue are far above the average of our grades of society; they do not contract these diseases in their own quarters, but in the surrounding civil communities, just as they would contract typhoid fever if that disease happens to be unduly prevalent in the respective locality. We believe, therefore, that our Army and Navy Statistics furnish a fairly accurate index of the relative frequency of sexual diseases among the celibate male population in this country. Indeed, we quite agree with Professor Fisher of Yale when he says in his Report on National Vitality "that venereal disease may be more prevalent in Civil life than in the Army and Navy service since the inhibitory influence of military restraint and discipline

do not exist and the opportunities for licentious relations are more abundant." The statistical inquiries which have been made in civil life reveal the following facts:

The statistics collected in 1908 by the President's Homes Commission, show that out of 274,611 patients treated in the city hospitals of Washington there were 9,869 syphilitic affections, 3,643 cases of chancroids and 14,435 cases of gonorrhoeal affections; total 27,947 cases of venereal diseases. The majority of the patients treated belonged to the dependent classes. We are unable to secure statistics of cases treated in private practice. Professor Parkes of England says: "It is a question whether a large number of the young men of the upper and middle classes do not suffer in youth from some form of venereal disease. In the lower classes it is perhaps equally common."

Neisser of Germany holds that gonorrhoea is, perhaps with the exception of measles, the most widespread of all diseases. Other German authorities have computed that fully three-quarters of the adult male population and one-sixth or more of the adult females have contracted gonorrhoea and that 15% of the population is syphilitic.

In 1901, a Committee of Seven, under the auspices of the Medical Society of the County of New York, made an investigation into the prevalence of venereal diseases, and from the information received from private physicians, reports of the hospitals and dispensaries, concluded that there were not less than 243,000 cases of venereal diseases treated in one year in that city. During the same year there were only 41,585 other cases of infectious or communicable diseases reported to the Health Department, viz.: measles, 12,570; diphtheria, 11,001; tuberculosis, 8,877; scarlet fever, 7,787; chicken pox, 99. In other words, the morbidity from venereal diseases was nearly six times greater than that from all the above named infectious diseases combined.

Dr. Prince A. Morrow, of New York, basing his statement on a large personal experience and upon the statistics collected in that city and in Baltimore in 1907 by a Committee on Sanitary and Moral Prophylaxis, says: "Assuming that our population is more virtuous than that of Europe, it must be a conservative estimate that in this country the morbidity from gonorrhoea would represent 60% of the adult male population, and that of syphilis from 10 to 15%." Which would mean that between 3 to 4 million cases are annually treated in this country. According to this same author, 20% of the cases occur before the 21st year; 60% before the 26th year, and 10% of the men who marry infect their wives. The report of the New York Committee "would indicate that nearly 30% of all venereal infections

occurring in women in private practice in the city are communicated by their husbands;" and from his personal observations at the New York Hospitals extending over a period of several years, he concludes that "fully 70% of all women who come therein for treatment were respectable married women who had been infected by their husbands."

In view of the foregoing American statistics, we conclude with Surgeon Fiske that "until it can be domonstrated to the contrary, it cannot be considered unfair to assume that one youth out of every six in this country between the ages of 17 and 24 contracts a venereal infection every year.

GENERAL CHARACTERISTICS OF VENEREAL DISEASES.

This class of disease includes all disorders which are usually, though not invariably, communicated from one person to another by means of impure sexual intercourse. If it be a simple excoriation of the organs which has been inoculated with some of the septic germs, it is called a chancroid; if it results in an inflammation of the urethra or vagina produced by a specific organism, it is called gonorrhoea, and if the primary structural and cutaneous lesion is caused by a specific organism which subsequently extends by means of the lymphatics to the blood, the skin, mucosa and to nearly all of the tissues of the body, even to the bones and periosteum, it is called syphilis; gonorrhoea and syphilis are the most important of the sexual diseases. While the two disorders are quite unlike in their nature and effects and are caused by distinct micro-organisms, they are similar in this;—that the development of their disastrous sequellae is usually slow and insiduous; the disease does not generally necessitate confinement of the patient in bed; the virus is not communicable except by intimate contact; and persons suffering from these diseases, as in the case of incipient tuberculosis, may not even be suspected of being carriers of infection. Syphilis may be acquired and even inherited, both diseases may be communicated in an extra-genital way, and therefore not only affect the offender but perfectly innocent persons, and even the unborn offspring. It has been well said that the microbe of gonorrhoea is exceedingly persistent and unlike some other infectious diseases does not confer immunity; indeed one attack rather predisposes to subsequent attacks. Syphilis is perhaps a more curable disease but the average young man thinks he knows more than his physician and rarely avails himself of the benefits of a prolonged course of treatment which is so essential for permanent recovery.

SYPHILIS.

This disease first attracted attention in Europe in the latter decade of the 15th century. During the siege of Naples by the French troops under the command of Charles VIII in 1495, a disease characterized by ulcers on the genitals, general eruption of the skin and violent pains in the head and limbs, broke out among the French soldiers and the civil population, and after the return of the French soldiers the disease appears to have spread rapidly throughout France and Europe. Quite early in the history it was recognized that the disease was principally contracted during sexual intercourse and hence was named "lues venerea," while the populace commonly spoke of it as the "Frenchman's disease." The real nature of syphilis remained a mystery until 1905, when Schaudinn discovered an organism now called the *treponema pallidum* which is believed to be the causative factor. The micro-organism evidently clings to the secretions of syphilitic ulcers, to the tissues of diseased organs and possibly also invades the blood and the mammary glands after it has ceased to be a purely local affection. The virus may be conveyed in an extra-genital way by kisses, use of infected drinking cups, pipes, cigars and cigarettes; by the mouthpieces of wind instruments; by dental and surgical instruments; by use of stick alum by barbers; by the act of suckling, from infants to nurse and conversely; in tattooing, and during digital examinations by physicians, in case of abraded surfaces, hang-nails, etc. There is every reason for assuming that the virus may be transmitted to the offspring, either through the sperma or the blood of a syphilitic mother.

Syphilis is indeed a disease of the blood and affects every tissue of the body. Apart from the long duration of the disease, and the pecuniary losses involved by care and treatment and arrest of the earning capacity, its effect upon longevity and procreation are most destructive.

Syphilis is responsible for 42% of abortions and miscarriages; from 60 to 86% of the offsprings of syphilitics die before or shortly after birth, and those who survive are subjects of generative and organic defects, transmitted to future generations. Fournier's personal statistics show that 90 women infected by their husbands became pregnant in the first year of married life, of these 50 aborted and 40 carried the offspring to full term, but of these only two survived. He also gives statistics, based upon authentic sources, where syphilis has practically extinguished the posterity of certain families. One table gives out of 216 births, 183 deaths; another out of 157 births, 157 deaths, or a mortality of 100 per cent.

The disease swells the number of inmates of almshouses, asylums for the insane and homes for incurables, wrecks the health and happiness of many families and leads to premature decay.

According to Dr. Prince A. Morrow, the number of syphilitics in the United States has been estimated at 2,000,000, and the extermination of social diseases would probably mean the elimination of at least one-half of our institutions for defectives. When we consider that the mortality from diseases of the nervous system and the circulatory system has increased in the last 27 years over 100 per cent., and that syphilis is one of the best known causes of this class of diseases, we have indeed good reason to feel alarmed. Morrow states that:

> "Every case of hemiplegia occurring in a man less than 40 years of age, not addicted to alcohol or affected with lesions of the circulatory system, is eight, or more correctly, nine times out of ten of syphilitic origin.
>
> "The proportion of ocular paralysis resulting from syphilis is about 75 per cent. on the average * * * * * * In statistics embracing 743 cases of cerebral syphilis, 354 of which were followed up to a known termination. 77 were cured, 68 died, while the remaining 209 survived, but with various infirmities of a grave character and in every case irremediable."

According to the statistics of Erb, Althaus, Fournier and others, from 80% to 90% of the cases of locomotor ataxia are of syphilitic origin. In 3,429 cases of tertiary syphilis, Fournier found diseases of the nervous system in 1,085 instances, cerebral syphilis in 461, spinal affections in 40, general paralysis in 32 cases.

GONORRHOEA.

This disease, so often regarded as a trivial affection by frivolous young men, is also specific in character, caused by a micro-organism discovered by Neisser in 1879. The organism clings to the discharges in acute and chronic cases and may persist long after the disease is apparently arrested. While at first a purely local affection, it may produce destructive inflammation resulting in stricture of the urethra; it may also extend to the testicles, prostate gland, bladder and kidneys, the joints, and ultimately affect the heart and other vital organs. Indeed the disease—gonorrhoea—is believed to be responsible for more misery, ill health and race suicide than any other sociological factor.

The average duration of acute cases is from four to six weeks, but there are a large number of chronic cases requiring at least six months' careful treatment and according to the investigations of a committee of the American Medical Association, 3 per cent. of the cases were practically incurable. One of the most frequent complications is gonorrhoeal rheu-

matism which affects the joints in about 30% of the cases. Another baneful effect is the latency of the disease due to the fact that the gonococci often persist in the genito-urinary secretions for years and hence the great danger of communicating the virus to wives by husbands who considered themselves as having been cured before marriage. It is certainly startling to be told by competent specialists that fully 80% of all the operations for inflammatory diseases peculiar to women, practically all of the pus tubes, 75% of the suppurative inflammations of the pelvic organs, 70% of all the cases which come to specialists for diseases peculiar to women are of gonorrhoeal origin. It is equally appalling to realize that the same germ is the cause of blenorrhea neonatorum, a purulent affection of the eyes of new born children which contributes a contingent to our asylums for the blind of from 10 to 20 per cent—from 40 to 60 percent, before the Crede methos of prevention was instituted. Dr. Swan M. Burnett, Professor of Ophthalmology, Georgetown University, expressed the conviction that at least 15,000 of the 50,000 blind persons in the United States lost their sight from this cause, involving a financial loss to the commonwealth of seven and one-half millions annually.

Every physician is familiar with cases of venereal diseases among children, in some instances contracted under revolting circumstances. Dr. Cole, in Osler's Modern Medicine, cites 19 epidemics of gonorrhoea with 660 cases among children in various hospitals. Dr. Holt has observed 273 cases in the "Babies Hospital" in New York of which 172 were acquired in the Hospital through the medium of napkins, baths, syringes, clinical thermometers and possibly tongue depressors. "The disease is undoubtedly carried from child to child by nurses who care for the infected as well as for the uninfected children."

The destructive effects of gonorrhoea on the procreative functions have been very properly emphasized in connection with the "race suicide problem." Neisser maintains that gonorrhoea is even a more potent factor than syphilis in sterility and that more than 45 per cent. of all involuntary childless marriages are due to this cause. Indeed very competent judges hold that the social diseases are the most powerful of all factors in the degeneration and depopulation of the world.

PREVENTIVE MEASURES.

The remedial measures which have been proposed for the prevention of these diseases and which affect not only the offender, but the wives, the offsprings and not infrequently also perfectly innocent persons, are numerous enough, but not so easy of application. Since the chief source of infection is prostitution, the sanitarian suggests that a person afflicted

with a venereal disease is quite as much a menace to public health as would be a case of small-pox or any other communicable disease and points with emphasis to what has been accomplished in Europe in the way of official control of prostitution, as a lesser evil, by registration of brothels and their inmates and periodical inspections and the detection and cure of diseased men and women. He will tell us, and the statistics will support him, that the prevalence of venereal diseases is least where sanitary measures are most rigorously enforced.

The medical profession is by no means agreed as to the propriety of this method, mainly because such a system seems too much like a recognition of the inevitableness of the social evil and practically an official sanction of it. Others, moreover, with good reason assert that licensing and sanitary inspection tend to produce a false sense of security, as inspection is insufficient to prove the absence of disease even in the hands of the most skilled and also because the system provides for the inspection of women only and not men, who are equally capable of spreading the disease.

In the crusade against the social evil every effort heretofore made, spasmodically to be sure, has been to apprehend the female offender, and all such attempts have simply resulted in secret prostitution which is far more dangerous in its social and sanitary aspects. Indeed every attempt to make laws upon the subject which apply to women and not to men is most unjust and establishes a different standard of morality for the two sexes.

As expressed by Morrow:

> "The prostitute is but the purveyor of the infection. She simply returns to her male partner, the prostituant, as he is termed, the infection she has received from another prostituant. In the ultimate analysis it will be found * * * * * * that the most essential cause, the *causa causans*, of prostitution is masculine unchastity—the polygamous proclivities and practice of the male, which lead him to seek the gratification of his sexual instinct wherever and whenever he can find a receptive partner. * * * * * * The woman owes her fall to the aggressive solicitations or seduction of the man. She may even be a quasi-willing victim, but she yields rather from sentimental feeling than from sexual inclination. * * * * * * Women are the most pitiless and unrelenting in the ostracism of those of their sex who have crossed the Rubicon of virtue. The virtuous matron who would shield her daughter from all contact with a fallen sister as contaminating, with most indulgent charity smiles upon the very man who may have been the author of her ruin; she may, indeed, receive him as a suitor for her daughter, if he is otherwise eligible. * * * * * * As a result of this double standard of morality society practically separates its women into two classes—from the one it demands chastity, the other is set apart for the gratification of the sexual caprices of its men. It thus proclaims the doctrine, immoral as it is unhygienic, that debauchery is a necessity for its men."

EDUCATIONAL METHOD.

On the whole your Committee believes that the remedy lies in public education which should be carried on along the same lines which is making the work of local societies and the National Association for the study and prevention of tuberculosis so effective. The great majority of the people have no knowledge of the subject, simply because of the erroneous assumption that it is not one which lends itself to general discussion.

It is indeed gratifying that such a respectable magazine as the "Ladies Home Journal" has given attention to topics of this character and has insisted for several years upon a greater parental frankness with children about their phyiscal selves. On the Editor's Personal Page, in the issue of September, 1908, we find the following courageous statement:

"Because of the secrecy with which the whole question is enshrouded it is practically impossible to obtain absolute figures. But so far as the highest authorities have been able, through the most careful inquiries, to secure accurate figures, it is a conservative statement to make that at least 60 out of every 100 young men are today "sowing their wild oats.' Of these 60 young men a startling number are either already making or will make a tragedy of marriage. They produce either childless homes, dead born or blind babies, children with life-long diseases with them, or they will send thousands of women to the operating tables. * * * * * * This frightful condition has been brought about largely by two contributing factors: first, the parental policy of mock modesty and silence with their sons and daughters about their physical selves, and, second, the condoning in man what is condemned in women. Fathers and mothers and in consequence girls, have condoned in a young man this sowing of his 'wild oats' because it was considered a physical necessity; that it 'would do him good'; that it 'would make a man of him'; that 'it would show him the world'—all arguments absolutely baseless. The remedies proposed are along the principles already indicated, viz.: knowledge of the subject, and that 'we fathers of daughters must rid ourselves of the notion that has worked such diabolical havoc of a double moral standard. There can be but one standard, that of moral equality. Instead of being so painfully anxious about the 'financial prospects' of a young man * * * * * it is time that we put health first and money second. * * * * * * Let a father ask the young man, as the leading question, whether he is physically clean; insist that he shall go to the family physician, and if he gives him a clean bill of health, then his financial prospects can be gone into. But his physical self first. That much every father would do in the case of a horse or a dog that he bought with a view to mating. Yet he does less for his daughter, his own flesh and blood. Once let young men realize that such a question would be asked them by the father of the young woman whom they would marry, that a physical standard would be demanded, and that knowledge would be more effective for morality among young men than all the preaching and moralizing and exhortations of the past thousand years. Thus, and thus only, can we save our daughters and their unborn children. But in no other way."

It should be stated that as early as 1873, the late Dr. J. Harry Thompson, then in charge of the Columbia Hospital for Women in Washington, advocated the plan of insisting upon a clean bill of health and related to

the class an instance in which a young man, after complying with what he considered a reasonable parental request, told the father: "Now that I have furnished you with evidence of my physical cleaness, I shall insist upon a similar evidence in your case, as I am equally anxious to perpetuate the purity of my blood."—to which request the father unhesitatingly acceded.

We cannot find words strong enough in commendation of the brave editorial and the excellent article, "The Tragedy of the Marriage Altar" by Dr. Abraham L. Wolbarst in the "Ladies Home Journal" for September and October, 1908. The medical profession has realized for years the necessity of proper education, for if we expect the parents to impart information on sexual purity, they must acquire it primarily from some competent and reliable source. Few of our magazine writers have heretofore been brave enough to present this question as the "Ladies Home Journal" has done. For all of these reasons members of the medical profession have advocated for years that hygiene should form a part of the curriculum in our public schools and the question discussed from the standpoint of sexual hygiene pure and simple. Public lecturers on the purity of man commit a serious mistake, generally, when they picture the consequences of the social evil without offering a suitable remedy. Many a young man thinks it essential to his health to give vent to his penned up secretions by sexual intercourse and to demonstrate his manhood. If deterred by fear of contracting venereal diseases, in the absence of other remedies he will most likely resort to unnatural methods.

We should make a strong plea in favor of continence, and tell our young men that while the sexual passion is very strong, it can be accelerated or delayed, excited or lowered by the influence of the will. We should assure them that sexual indulgence is not a physiological necessity, and that nature will relieve herself by an occasional nocturnal emission. By the cultivation of pure thoughts, removal of temptation, normal mental condition, and especially by cold baths and vigorous physical exercise and avoidance of an excessive meat diet, continence may not only become possible but easy. Those who witness the good effects of athletic sports cannot fail to appreciate that here is a good field in which to expend exuberant animal spirits, and in this sense, "public playgrounds" are a strong factor in the promotion of sexual purity. We can hardly go astray if we follow Dr. Parkes in advising a pure young man to make his home after the age of 22 or 23, and thus secure himself both from the temptations and expenses of bachelorhood. Dr. Howard A. Kelly believes that the Christian standard is the solution of the whole problem of chastity. We quite agree with him, provided the church makes an endeavor to combine

religious and social work, and until this is accomplished we should not hide the evil because it is not a pleasant subject to talk about.

Among the sensible recommendations submitted by the "Committee of Fifteen" in the City of New York, were:

> "First, strenuous efforts to prevent, in the tenement houses, the overcrowding which is the prolific source of sexual immorality. * * * * * * Secondly, the furnishing, by public or private munificence, of purer and more elevating forms of amusements to supplant the attractions of the low dance halls, theatres and other similar places of amusement that only serve to stimulate sensuality and to debase the taste. The pleasures of the people need to be looked after far more earnestly than has been the case hitherto. * * * * * * Thirdly, whatever can be done to improve the material conditions of the wage earning class, and especially of young wage-earning women, will be directly in line with the purpose which is here kept in view. It is a sad and humiliating admission to make, at the opening of the 20th century, in one of the greatest centers of civilization in the world, that in numerous instances it is not passion or corrupt inclination, but the force of actual physical want, that impels young women along the road to ruin."

Referring to the question of intimate contact in tenement houses as a predisposing cause to prostitution, it is a matter of satisfaction to record that both General Sternberg and Dr. Kober realized this danger when they urged, in 1898, the adoption of model two-story apartment houses with separate entrance and exits for each family so that the sanctity of home might be preserved.

STATE METHODS.

The question naturally arises—what can and should the state do to prevent the moral, social and physical ravages of these diseases? It must be confessed that the measures looking to the inspection and control of prostitutes are sadly inadequate. It has been suggested by German authors that the evil might be materially lessened by holding the persons who knowingly spread venereal diseases responsible for the damages. Indeed a German jurist goes so far as to advocate the punishment of persons who neglect to seek treatment when afflicted with venereal diseases. Apart from this the State should certainly insist upon:—

First; compulsory notification of venereal diseases; the enforcement of laws or police regulations relating to houses of ill-fame, and to the sale of alcohol, particularly to minors; a closer supervision of soliciting in streets and the enticement of females under a fixed age. There is certainly no good reason why the terrible temptations which greet our young men and women on every street and in many public places should not be removed. A well-trained police force will have no difficulty in recognizing and ban-

ishing the solicitors, both male and female, from the streets, and in cautioning young men, especially minors, of the dangers of the red light district.

Second; Health Boards can also recommend the enactment of laws for the prevention of syphilis acquired in an extra-genital way, by regulating the profession of barbers and chiropodists and manicurists and requiring a special examination of wet nurses, cigar-makers and glass blowers. Apart from the real dangers of these sources, the educational effects of such ordinances will be beneficial.

Third; Health Boards should also exert their influences towards securing adequate facilities for the treatment of indigent patients. In Havana, a dispensary for the treatment of these diseases is kept open at night to meet the necessities of laborers who cannot by reason of their work come in the daytime. It is supported by the funds of the "Special Section of Hygiene."

In Northern Europe, where venereal diseases are reportable and treatment is within the reach of all classes, these diseases, according to Weiss, have greatly diminished; but here, as Bulkley puts it,

"ignored through ignorance, neglected through negligence of our duty, so ostracized and outclassed, venereal diseases, through false shame, concealment, prejudice, carry on their slaughter unhampered, unchecked and undisturbed, devastating coming generations and ruining the present one."

Fourth; Health Boards may co-operate with the profession and dispensaries by printing for distribution, leaflets stating the nature of the diseases, the manner in which they are contracted and the ways in which they may be transmitted to other persons, and by the encouragement of a general educational campaign in which sexual purity, respect for women, and the possibility of physiological continence should be inculcated. The evil and far reaching consequences of impure and unlawful gratification should be clearly pointed out.

A word of caution is necessary to impress upon the victims of venereal diseases the utter uselessness of treating with various advertised cures. As very properly said by Mr. Samuel Hopkins Adams in "Collier's Weekly," September 22, 1906:

"All this class of practitioners are frauds and swindlers. Many of them are ex-criminals in other fields. 'The Old Doctors,' the 'Physicians' Institutes,' the 'Medical Councils' and the 'Quick Cures' are all equally to be shunned. Blackmail is the underlying principle of this business. These treatments can not cure; ten to one they only aggravate the disease and render it dangerous or even deadly. But once they have a man in their clutches they need not help him in order to get his money. If he demurs at their charges a threat to expose the nature of his ailment to his family

or employers is enough. * * * * * * Every advertisement of private diseases or 'men's specialists' ought to be a danger signal pointing not only to wasted money, shame and misery, but often to invalidism and a dreadful form of death, where in 90% of cases, reputable treatment would have brought the patient through.

"In some localities it is against the law to publish advertisements of this class. Pennsylvania has such a law, but it is a dead letter. St. Louis is attempting to enforce its illegal advertising ordinance and the St. Louis newspapers are fighting to save themselves the dollars tainted with unspeakable filth."

Your Committee desires to express its approval of the excellent prophylactic measures which have been adopted by the Medical Department of the United States Army and Navy. This prophylaxis, according to Surgeon Fiske,

"comprises a campaign of education conducted by Medical Officers in connection with first aid instruction and the unobtrusive distribution of confidential circulars setting forth the dangers of sexual relations with any woman who practices prostitution. Concealment of a venereal disease is punishable in these services. In the Navy a copy of each day's liberty list is furnished the Medical Department, upon which, opposite each man's name, upon his return to the ship, is checked his denial or admission that he has exposed himself by intercourse; his statement is accepted by the hospital attendant and, if affirmative, he is given opportunity to thoroughly cleanse the parts with soap and water, and on some ships with mercuric chloride solution; this is followed by an urethral injection of some disinfecting solution (usually of an organic silver preparation) which is retained for several minutes; the next step is the thorough application, by rubbing into the glans and prepuce, of a 30 per cent. calomel ointment. If venereal disease develops after a denial of coitus, after due consideration of the probable incubation period, disciplinary measures for a serious infraction of regulations are in order. Some medical officers, particularly on the small ships, conduct physical inspections before the men are allowed to go ashore. after their return, or at irregular intervals, as varied experience may dictate. Men are deprived of shore leave while suffering from venereal disease. Each patient is furnished with a copy of the appropriate 'Confidential Circular of Information Nos. 2, 3 or 4."

"The Navy Department has not yet been able to decide that the German method of carrying a packet of prophylactic medicaments for use ashore with 'malice aforethought' is practicable for the higher order of enlisted men which we are now recruiting. * * * * * * Astonishingly favorable results have been repeatedly reported during the year to the extent that, on numbers of vessels visiting the same highly infected ports, where venereal disease was formerly the rule, a reduction of from 75 to 95 per cent. has been obtained."

Fleet Surgeon Diehl of the United States Asiatic Squadron, in considering the statistics for 1909, reported:

"The percentage of 'denials of exposure' was 67.75. There has been a constant monthly increase of this percentage, and this, or what amounts to the same thing, a steady diminution of the number admitting exposure, may have some ethical significance. The prominence given to the question of venereal disease by commanding and medical officers, the talks on personal hygiene, the institution of the prophylactic scheme in itself, have been beneficial by bringing the better class of men to a great-

er realization of the evils frequently resulting from exposure and by stimulating the latent moral sense. In any event, *there is no reason to think that a sense of security engendered by the scheme has caused any increase in indulgence.* The claim for the scheme will cause a greater number of concealments of disease has also been refuted on the *Charleston*, by a recent examination of the entire crew, not a single case of concealed disease being found."

As a result of year's experience and observation, Medical Inspector Diehl felt justified in submitting the following conclusions:

"That venereal diseases can be almost entirely eliminated from the naval service by timely prophylactic treatment.

"That since venereal diseases cause greater damage to efficiency and loss to the Government than any other, nothing should be permitted to stand in the way of the general adoption of this treatment.

"That its efficient application is dependent upon departmental authorization and the co-operation and support of those in command and having disciplinary powers.

"That with such support and authorization the medical officer is responsible for the existence of venereal diseases and that upon him must fall the opprobrium of its existence.

As pointed out by Surgeon Fiske:

"The Naval Surgeon practices compulsory notification and sees no logical reason why civil sanitary codes should not define venereal cases as equally notifiable with typhoid. He recognizes venereal disease as a terribly unmistakable condition and leaves its conception as a theory to the myopic moralist who has never been willing to recognize it as anything but a theory. Can any appeal reach the influential civil official to get him to co-operate with the military sanitarian by offering personal prophylaxis throughout the long years which will transpire before a moral regeneration displaces prostitution. Can he be persuaded that it is worth while to prevent hundreds of our young men throughout the country each day contracting such a loathsome disease as syphilis? If a plea can be entertained only for the innocent let us protect the future wives and progeny from irremovable blight."

The Surgeon General of the Army says in his last report referring to venereal disease (p. 57-58):

"The magnitude of the evil and the large loss from inefficiency in addition to humanitarian considerations, have induced the military authorities at a number of military posts to take earnest steps to check the spread of these infections. Such steps have been the instruction of soldiers by lectures as to the danger of venereal diseases and the healthiness of continence; periodical inspections to detect and subject to medical observation and treatment those found diseased; the withdrawal of passes to be absent from the post of such, and the issue of preventive medicines for local application to such as will not be restrained by considerations of morality or prudence from exposure. These antiseptic applications are given only upon the personal request of individuals. If such steps were taken universally throughout the army and a campaign of education instituted which should reach each recruit from his admission to the service, it is believed that the evil record of the American Army might be greatly bettered."

The inclination of our people to ignore the existence of conditions which offend their moral sensibilities and for which no remedy is apparent is a most unfortunate expression of a praiseworthy moral attitude. It is that of the ostrich hiding its head in the sand in the presence of danger. To this attitude is due the refusal of American Communities to treat this very dangerous class of contagious diseases like other contagious diseases by suitable restrictive measures, such as reporting, inspections and lock hospitals. Although prostitution has been always an invariable concomitant of civilization, we refuse to recognize the fact and to take rational measures to restrict the boundless physical mischief which the prostitute causes as a purveyor of diseases, lest the recognition of the danger be construed as a recognition also of the trade. And some wise men are found who gravely affirm that measures which prevent the spread of these diseases will, by making illicit intercourse more safe, encourage vice. If it could be shown that fear could effectually control the most basic and most imperious of our instincts, the reproductive impulse, this argument might be worthy of consideration, but, unfortunately the evidence is all the other way.

Equally unsocial and even more illogical are those who, like their prototype of old on the road to Jericho, pass by on the other side, and proclaim that those who break the moral law deserve no pity for whatever befalls them. This attitude might be defensible if these diseases attacked only the depraved and habitually licentious. On the contrary not only we physicians but every man of the world knows that among our bravest and highest types of manhood are many who in the hey-day of their youth have not always shown the self-control of Joseph:

> "How many a father have we seen.
> A sober man among his boys,
> Whose youth was full of foolish noise,
> Who wears his manhood hale and green."

If the Pharasee shall say that these are not worth every effort to save, what shall he say to the great army of the innocents, the gentle wives, the young children, who shall bear the sins of their husbands and their fathers.

It is a condition, not a theory, that confronts us, and the condition is too urgent to be left longer to the theorists and the formalists. It is believed that a campaign of education should be initiated and that this Association should set the example of moral courage:

Your Committee recommends therefore:

I. The recognition, study and control of the prevalence of gonorrhoea and syphilis by the state boards of health, as with all other communicable preventable diseases, by securing reports from physicians of cases by num-

ber, at first by request and later by legal requirements, in order to ascertain the distribution of these diseases.

II. An educational campaign for parents of all social classes and children of all ages and sexes. This teaching should be not only moral but also medical in the widest sense. It will not do at present to rely on the moral argument.

(a) Proper distribution of circulars, pamphlets and other literature by State Health Departments through all suitable channels.

(b) State Health Departments to instruct all its local health officers in sexual matters and direct them to make a systematic effort to educate the people in their respective communities.

(c) State Health Departments to make a definite and determined effort to awaken and interest the medical profession in this fight against venereal diseases.

(d) State Health Departments to send out especially trained paid teachers and lecturers of their own, supported by exhibits and lantern slides, to address special meetings of parents, health officers, medical men, teachers and others in schools, colleges, churches, etc., on these and other preventable diseases.

(e) State Health Departments to encourage the organization of local leagues or associations, whose purpose shall be the support of and control of a crusade against the spread of all communicable diseases.

1. Said societies to include every profession and walk of life.
2. To depend preferably upon philanthropists for necessary funds, rather than upon paid subscriptions for financial support.

(f) State Health Departments to interest and provide for the authorities having charge of the educational curriculum in public and in private schools.

1. By introduction of biology into the graded course of all schools.
2. By introduction into the text books on physiology of the upper grades instruction in reference to anatomy and physiology of the urinary and sexual organs.
3. By special instruction to normal school students who are to become the instructors. To impress upon the preceptors and teachers of those subjects, presidents and deans of all colleges the necessity of repeated instruction in reference to the communicability of syphilis and gonorrhoea and to inculcate a morale of protection among the college fraternities.

4. To utilize the public press for the proper occasional presentation of the subject and to discourage the display of advertising matter which encourages the exposure to dangers in these diseases.

5. To utilize churchmen's clubs, fraternal societies, trades unions, women's clubs, and especially mother's clubs for the immediate instruction of parents.

(g) State Health Departments to recommend the enactment of laws for:

1. Registration, physical inspection and segregation of prostitutes.
2. Notification and report (by number if desired) of venereal cases.
3. Physical examination of men before marriage.
4. Penalizing and holding to a strict (perhaps money damage) accountability those knowingly responsible for the transmission of venereal diseases.
5. Keeping open free night dispensaries and maintenance of special dispensaries and hospitals for these diseases.

III. Advocacy of temperance on account of the relationship between alcoholism, venereal diseases and insanity.

IV. Advocacy of personal cleanliness and venereal prophylaxis for those whose carnal appetites cannot be controlled by the agencies of moral prophylaxis.

V. Advocacy of early marriages.

These recommendations were adopted unanimously by the Committee except the one referring to registration, physical inspection and segregarion of prostitutes, in regard to which a minority was opposed on the ground of expediency.

George M. Kober,
Jefferson R. Kean, U. S. Army,
Charles N. Fiske, U. S. Navy,
J. W. Kerr, Public Health Service,
Eugene H. Porter,
Gardner T. Swarts,
George W. Goler,
Juan Brena.

A CONSIDERATION OF VENEREAL PROPHYLAXIS IN THE U. S. NAVY FOR THE BENEFIT OF PUBLIC HEALTH OFFICIALS*

By CHARLES N. FISKE, M. D.,
Surgeon, U. S. Navy.

One man out of every seven in the navy develops a venereal infection each year; assuming an average of four years' service for each individual we judge that over 50% of the personnel have a venereal disease at some time during this relatively brief portion of their lives.

Surgeon General Rixey stated in his annual report for 1909 that during the year 1907, if applied solely to the force afloat, this class of disease "would have operated to render entirely inactive for over a month three battle ships with a complement of 1000 officers and men each." In 1908 there were 6514 total admissions for venereal affections of which 4681 represented original infections; these cases furnished 106,526 sick days which represent a loss of service and treatment expense to the government of over two hundred thousand dollars. During that year 1001 cases of syphilis alone occasioned 36,645 sick days or nearly 7% of the total disability. For the ten-year period 1899-1908 the average number of persons which these sick days would represent as constantly disabled from syphilis throughout the year was 82.7.

> "From the above is adduced the fact that the Government not only loses the services, but must defray all the expenses of illness of approximately 1000 men for an entire month out of every year on account of this single venereal disease."

The mentality, general morale and station of the enlisted personnel of the navy has steadily improved during the past ten years—the years of great expansion of the service; at the same time the apparent incidence rate for venereal disease had risen to such a point (108.42 per 1000) four years ago, that certain progressive medical officers were no longer content to wait for moral regeneration, which promised to require incalculable time, but decided that the problem was sufficiently urgent and damaging to military efficiency to justify them in attacking it with almost as practical weapons as they naturally would any other disease producing factor. The instruments of offense have been increasingly educational but owing to the moral question involved the defensive measures have hardly yet

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

reached the rational point whereby one dons clothing before exposure to cold. If one must, or is determined to undertake the risk of contracting a cold, the warm coat before and the hot drink after, are considered to be properly indicated; if he WILL undertake the chances of venereal infection and if it is not quite proper to use the before-exposure, then the naval surgeon says he shall use the after-exposure, prophylaxis. Inunction with calomel ointment and injection with an organic silver preparation may seem to be the locks applied to the stable door "after the horse has been stolen," but certain substantial, even if hardly convincing, results are achieved with yet a margin of failure sufficiently wide to deter the enlightened from cherishing any assurance of immunity. It is assuredly no more immoral or unmoral to apply cleansing and antiseptic measures following exposure than by not using them, to leave the issue to an indiscriminating Fate, who perchance will spare the roue and cruelly punish the misguided first offender.

Surgeon Arnold* only three years ago in urging more rational treatment (prior to discharge) of syphilitics in the Navy, very pointedly remarked:

> "But I regard the implication of any government, that advertises publicly, conspicuously and flamboyantly for young and unmarried men for its services and that employs them under conditions that prohibit them normal sexual relations for the most part, as logical, absolutely subsequently to conserve at least such young men's physical welfare. Instead, we find those of them that acquire syphilis, systematically discriminated against by government agents, whom collectively this body represents. These immature and often uncautioned men's moral weakness, under the stress of an instinct that is fully as strong as the love of life, is designated by these agents as viciousness without the least allowance for the real state of the case. This prejudice, which can only be explained by the academic theological deduction that venereal diseases are punishments for illicit sexual incontinence, is a phase of incomplete public logicality that cannot be discussed here."

Men do not contract venereal disease from the navy but from the civil communities which surround our yards, stations and ports. Certain municipalities are notoriously indifferent as to the amount of typhoid infection which they furnish the navy, but all are infamously indifferent as to the venereal infection. The naval surgeon practices compulsory notification and sees no logical reason why civil sanitary codes should not define venereal cases as equally notifiable with typhoid. We recognize venereal disease as a terribly unmistakable CONDITION and leave its conception as a THEORY to the myopic moralist who has never been willing to recognize it as anything but a theory. Can any appeal reach the

* The Opportunities Afforded by the Military Services for Applying Statistical Methods in Therapeutics. The Military Surgeon, Vol. XXI, No. 3.

influential civil official to get him to co-operate with the military sanitarian by offering personal prophylaxis throughout the long years which will transpire before moral regeneration displaces prostitution? Can he be persuaded that it is worth while to prevent hundreds of our young men throughout the country each day contracting such a loathsome disease as syphilis? If a plea can be entertained only for the innocent let us protect the future wives and progeny from irremovable blight!

The admission rate for 1908 already cited, may be calculated to startle those of us who have little idea of the extent of venereal diseases throughout our cities and towns, and the navy's figures for 1909, following systematic inspection of crews for last year on but one station, point to our own former lack of information as to their actual prevalence, for now that substantially all cases are reported we find the admission rate over 160 per thousand. The army admission rate for 1908 was over 174 per thousand for the troops stationed in the United States. It may be contended that enlisted men of the army and navy are not representative of our civil population, yet observant civilian authorities concede them to be now above the average of our grades of society and it must not be forgotten that the source of supply of our 15,000 first enlistment recruits and the destination of a similar number of men discharged each year is the civil population. Until it can be demonstrated to the contrary, it cannot be considered unfair to assume that one youth out of every six in this country between the ages of 17 and 24 contracts a venereal infection every year.

With regard to the details of prophylaxis, the writer has recently said elsewhere:*

"Venereal prophylaxis has been attempted and quietly practiced by a number of medical officers for some years, but, so far as the writer is informed, no energetic and systematic campaigns were instituted in the United States Navy until 1907, and it was not until December 17, 1908, that this procedure was favored by the weight of official departmental approval. While various schemes are still being tried out, some succeeding where apparently others have failed or would not be practicable, briefly, venereal prophylaxis in the naval service now comprises a campaign of education conducted by medical officers in connection with 'first-aid' instruction to successive sections of the crew, and the unobtrusive distribution of 'Confidential Circular of Information No. 1,' " the text of which follows:

* A System of Syphilis, by D'Aarcy, Power and J. Keogh Murphy, Vol VI, London, 1910.

CONFIDENTIAL CIRCULAR OF INFORMATION NO. 1.

WARNING CIRCULAR.

"1. To have sexual relations with any woman who practices prostitution exposes you to very painful and life-endangering diseases of long standing which may be transmitted to your future wife and children, rendering them mentally and physically defective.

"2. A prostitute presenting a physician's certificate of health proves thereby only that she *was* in health when examined. She may have contracted a dangerous disease a few minutes after the examination.

"3. The mouth secretion in such women is often capable of transferring disease, hence kissing, or the use of a cup or glass, spoon, fork, etc., which may not have been thoroughly cleansed after being used by a prostitute, may transmit syphilis with its horrible consequences.

"4. The fact that a prostitute appears clean and free from the signs of disease does not prove her so. The absence of disease can be established only by a very complex medical examination.

"5. If, with a knowledge of what little has been told you herein, you will risk your health and life, you must endeavor to protect yourself and those about you by a simple treatment to be obtained upon application at the sick bay and used as soon as possible after returning from liberty. No man who has been exposed to venereal infection ashore should neglect to seek the treatment to be obtained at the sick bay promptly upon return from liberty. Remember that to conceal a venereal disease you lay yourself open to severe punishment.

"A copy of each day's liberty list is furnished the medical department, upon which—opposite each man's name, upon his return to the ship—is checked his denial or admission that he has exposed himself by intercourse; his statement is accepted by the hospital attendant, and, if affirmative, he is given opportunity to thoroughly cleanse the parts with soap and water, and on some ships with mercuric chloride solution; this is followed by an urethral injection of some disinfecting solution (usually of an organic silver preparation) which is retained for several minutes; the next step is the thorough application, by rubbing into the glans and prepuce, of a 30 per cent. calomel ointment. If venereal disease develops after a denial of coitus, after due consideration of the probable incubation period, disciplinary measures for a serious infraction of regulations are in order. Some medical officers, particluarly on the small ships, conduct physical inspections before the men are allowed to go ashore, after their return, or at irregular intervals, as varied experience may dictate."

Men are deprived of shore leave while suffering from venereal disease. Each patient is furnished with a copy of the appropriate "Confidential Circular of Information, No. 2, 3 or 4," the texts of which follow:

Confidential Circular of Information No. 2.

INSTRUCTIONS FOR THOSE HAVING GONORRHEA (CLAP).

Your disease is not a simple but a serious matter and requires great care in treatment by the doctor, and strict obedience to the directions by you, in order to restore the organs to perfect health. It is, therefore, necessary that you do with faithfulness what the doctor orders. If you do not, it is possible that the disease will produce later in your life serious conditions which may damage your health and indeed threaten your life. Gonorrhea is a communicable contagious disease, and in order to avoid infecting other persons and to prevent such complications as bubo, swollen testicles, abscesses and stricture, etc., the following rules should be observed:

Do not drink any intoxicating or alcoholic liquors whatever, because the alcohol in the urine damages the diseased parts, and *do not drink* any spicy or soft drinks, like ginger ale, whatever, for the reason that the spicy material in the urine irritates the diseased parts, and *do not eat* any peppery or spicy foods or pickles whatever or drink any coffee or tea for the same reasons.

Do not take any violent exercise, as far as possible, such as running, horseback riding, or bicycling.

Do not indulge in any sexual excitement or sexual intercourse whatever, directly or indirectly, until pronounced cured by the doctor, as the disease may be given to a woman even after the visible discharge has ceased. Moreover, sexual excitement always prolongs and aggravates the disease through the erections of the penis.

You must wash and dress the penis with the gauze apron at least three times daily, or as directed by the doctor, and under the supervision of a sick-bay attendant.

Do not use cotton over the mouth of the penis, because it corks in the discharge, and do not wear the so-called "gonorrheal bag," because it soon becomes smeared with pus inside and is then dangerous.

You must always burn or throw overboard all soiled dressings.

You must always wash your hands after dressing the penis, because the discharge is blinding, and may be carried to your eyes by dirty fingers.

You must sleep alone and be sure that no one else uses any of your toilet articles, particularly towels and wash cloths.

Your bowels must move once every day.

You must drink all the water possible, excepting during meals and up to six hours before going to bed.

You must remain reasonably quiet, and must take the medicine regularly and as directed.

You must treat chordee by wrapping cold, wet cloths about the penis, and after the erection has subsided by emptying the bladder. Never force the penis down, as you may rupture it.

You must come for treatment with as much urine in the bladder as possible, so that the doctor may examine the urine at each visit.

"Shreads" or "floaters" in the urine show that you are not yet well and are still in a condition of danger to yourself and to any woman with whom you have intercourse.

Remember that to conceal this trouble lays you open to severe punishment.

Confidential Circular of Information No. 3.

INSTRUCTIONS FOR THOSE HAVING CHANCROID.

(EATING CHANCRE, SOFT CHANCRE, SOFT SORE.)

Your disease is serious, because its poison destroys flesh. If you do not obey the directions of the doctor carefully, this destruction may be great and result in severe complications, such as bubo, which may lay you up in bed for many weeks.

You must wash the penis at least every morning and every night with hot water and soap.

You must use a special piece of soap for the washing and *destroy* the soap when you are well.

You must dry the sore carefully after each washing.

You must use for this purpose clean, soft cloths or cotton or gauze mops, burning them or throwing them overboard immediately after each and every use.

You must put on a fresh dressing as directed after each washing; any dressing or treatment must be done under the supervision of the doctor or a sick-bay attendant.

You must always wash the hands after dressing the sore, because its discharges are dangerous to the eyes and may be carried to the eyes by dirty fingers.

You must not have sexual intercourse in any circumstances, because you are sure to transfer the disease to the woman.

You must sleep alone and be sure that no one else uses any of your toilet articles, especially soap, towels, and wash cloths.

Your bowels must move once each day. If you are costive get a small dose of salts from the doctor and take it in hot water before breakfast.

You will not be perfectly well and out of danger until the sore is completely healed. The doctor is the best person to decide this question after careful examination. Do not, therefore, cease treatment until he has pronounced the sore healed.

Remember that the Navy Regulations require that you should not conceal this trouble, but seek treatment promptly from the doctor. Concealment or self-treatment of this disease makes you liable to severe punishment.

Confidential Circular of Information No. 4.

INSTRUCTIONS FOR THOSE HAVING SYPHILIS (LUES, POX, BLOOD DISEASE).

Syphilis is a treacherous and dangerous disease of the entire system. It is curable but is only cured by a long course of treatment, lasting for several years even when there are no external signs of the diesase. A perfect cure requires at least two, preferably three years of faithful treatment, because it is "in the blood." Healing the chancre and taking the medicine for a *few weeks or months*, until the visible signs of the disease disappear, will not cure your blood of the syphilitic poison. It is therefore necessary that you follow the doctor's orders most carefully. If you do nót, you are in danger of having the disease appear in the future in some important part of the body, like the brain, spinal cord, bones, arteries, or other organs, as the liver. If you do not follow directions, it is also possible that your wife and children will acquire the disease from you. Syphilis is extremely contagious, especially by the

sores and erosions, however small they may be, which generally occur on the genital organs and in the mouth, but which may be produced in any part of the body. A patient with syphilis must, therefore, abstain from any sexual intercourse, during the first year especially, when he has even the smallest evidence of a sore or break in the skin on the genital organs. He must also abstain from kissing when he has sores on the lips or tongue or in the mouth, for a kiss, even on healthy skin, may be dangerous. The disease may also be transmitted through the medium of any object which has been in contact with the secretions of the diesase—glasses, toothpicks, spoons, forks, bottles, pipes, plug tobacco, cigars, cigarettes, linen, towels, brush, comp, soap, razor, clothing, mess gear, etc.; in fact, any contact with a syphilitic person or the secretion of the disease is dangerous. It is very important for a syphilitic subject affected with any other illness to always inform the doctor of his former syphilis, for this knowledge may be useful for the direction of treatment and the cure of the complaint, even when the syphilis is long cured. It will therefore be entirely to your own benefit for the doctor to know about your syphilis.

The following directions are of particular importance during the first year and whenever, if you neglect yourself, the symptoms break out again:

1. *Alcoholic liquors in all forms must be avoided*, because alcohol is a poison, which, added to the poison of the syphilis, makes the syphilis much less likely of perfect cure.

2. *Do not smoke or chew tobacco*, because the irritation of the tobacco increases the severity and duration of the mouth sores of syphilis, and *sour, acid, peppery, and spicy foods and pickles* should be avoided for the same reason.

3. *Brush your teeth and wash your mouth* every night and morning. Cleanliness of the teeth and mouth decreases the severity and duration of the mouth sores of syphilis.

4. *Have the dental surgeon treat your teeth* if they are bad. Tell him that you have syphilis, so that he may take precautions against catching the disease himself or giving it to other patients.

5. *To avoid* giving the disease to your family, friends, or shipmates, observe the following rules strictly:

(*a*) Always sleep alone.

(*b*) Always use only your own toilet articles, such as towels, brushes, combs, shaving brushes, razors, soaps, etc.

(*c*) Have your own razor and shave yourself.

(*d*) Have your own mess gear and keep it apart from others.

(*e*) Always keep only for your own use any articles which have been in contact with your mouth such as toothpicks, toothbrushes, pencils, pipes, cigars, cigarettes, forks, spoons, cups, etc.

(*f*) Always avoid kissing anyone, especially young children, and especially during the active period of the disease (the first two years). The innocent party can hardly escape infection with syphilis if you have open sores in the mouth.

(*g*) Always burn or throw overboard all dressings which have been in contact with sores or wounds.

(*h*) If you disobey these instructions, you will certainly give the disease to innocent persons.

Remember that the Navy Regulations require that you should not conceal this trouble, but seek treatment promptly from the doctor. Concealment or self-treatment of this disease makes you liable to severe punishment.

The substance of these ciruclars comprises information given in numerous former and sporadic attempts to better conditions, one of the earliest circulars being that written by the present Surgeon General of the Navy, C. F. Stokes, who was then (1901) serving on the U. S. S. "Oregon."

"The Navy Department has not yet been able to decide that the German method of carrying a packet of prophylactic medicaments for use ashore with 'malice aforethought' is practicable for the higher order of enlisted men which we are now recruiting. * * * * Astonishingly favorable results have been repeatedly reported during the year to the extent that, on numbers of vessels visiting the same highly infected ports, where venereal disease was formerly the rule, a reduction of from 75 to 95 per cent. has been obtained.

"Because this system of prophylaxis has not yet been adapted to the problems with which many of the ships are confronted, and but one of the smaller fleets has provided a uniform routine for a full year, the statistical table does not demonstrate that the problem is solved; it is still too early to proclaim dogmatically the service's independence of the proverbial disregard of civil communities for venereal disease, yet, out of 6,083 liberties from the U. S. S. *Charleston* (complement 836) during the five months of venereal prophylaxis, not a single case of syphilis developed. Statistics on this ship for the full year 1909 show that out of 12912 liberties 11898 or 92.14% reported at the sick bay and of these 6,412 or 53.89% admitted exposure and received prophylactic treatment. Of the 148 admissions (1.15% of the liberties) for venereal disease (gonorrhoea 80, chancroid 66 and syphilis 2) 34, including both cases of syphilis, developed among those who failed to report; 21 denied exposure, 32 overstayed liberty, 37 had extended liberty and 24 developed disease in spite of treatment, the latter number representing 0.4% of failures in "timely prophylaxis."

"A report from the U. S. S. *Ranger* shows the result of treatment after 39 liberty parties between Olongapo, Philippine Islands, and Portsmouth, N. H., there were 256 admitted exposures in either Singapore, Columbo, Cairo, Port Said, Naples, Villefranche, Gibraltar, or Bermuda, without the development of a single case of venereal disease."

Medical Inspector Diehl*, U. S. Navy, as fleet surgeon of the U. S. Asiatic Fleet has summarized the results of prophylaxis following contact with a well known badly infected foreign population for the year 1909 as follows:

Total number who went on liberty	70954
Number who reported upon return from liberty	65635 or 92.5%
Number who failed to report upon return from liberty	5319 or 7.5%
Number who admitted exposure and received treatment	21166 or 32.2%
Number who denied exposure	44469 or 67.7%
Total number of primary venereal admissions during 1909: (Gonorrhoea, chancroid or syphilis)	599
Percentage (based upon number going on liberty)	0.84

* Venereal Prophylaxis on the Asiatic Station, U. S. Naval Medical Bulletin, Vol. IV, No. 3.

Total number of cases (599) classified, with reference to probable cause:

Failure to report	113	18.86%
Denial of exposure	85	14.19%
Overstaying liberty	85	14.19%
Extended liberty	140	23.37%
Failure of treatment	176	29.38%

Failure of treatment (based upon total number admitting exposure), eighty-three hundredths per cent. (.83 per cent).

"The above covers the entire year of 1909. During the last six months, the cases have been further classified, as follows: Total number of cases during this period, 373; viz., Gonorrhoea, 246; chancroid 108; syphilis 19; subdivided, with reference to cause as follows:

Failure to report	66	(Gon. 48; Chan. 13; Syph. 5).
Denial of exposure	43	(Gon. 23; Chan. 17; Syph. 3).
Overstaying liberty	43	(Gon. 33; Chan. 110; Syph. 0).
Extended liberty	106	(Gon. 70; Chan. 30; Syph. 0).
Failure of treatment	115	(Gon. 72; Chan. 38; Syph. 5).

Recent reports from the Asiatic Fleet indicate that the number of primary venereal admissions was, for the first quarter of the current year, 20% less than the average for the last two quarters of 1909.

The full scheme of prophylaxis

"was not in use in all the ships from the very first, those happening to be on detached duty falling in line as soon as they became aware of its adoption and stations on shore have adopted it only recently. At the latter no liberty list is made out. Men go and come at irregular times and checkage similar to that on board ship is impracticable. Men are, however, ordered to report for treatment after exposure and if they develop disease it can readily be ascertained whether or not they took treatment. In the total number of men reported as going on liberty only those on shore stations who reported for treatment are included. Nor does this report include readmissions for recurrence of disease, for sequelae, nor on account of transfers. The cases reported were all primary admissions, the disease having developed within the period covered by the report, and are classified as cases of Gonorrhoea, Chancroid or Syphilis."

The number, 70954, reported above as going on liberty of course does not include every man, but it does cover most of these going from ships during the year.

"Liberty was given in all the principal ports on the station, from the southern Philippine Islands to Vladivostok, and the ports visited probably represented the two extremes of cleanliness as regards venereal diseases. At Cavite, Manila and Olongapo, prostitution is under police supervision and medical inspections are regularly made. In Japanese ports the same system is supposedly in use, although clandestine prostitution reduces the value of the system as affecting enlisted men. Chinese ports are notoriously unclean, although some of the men serving on vessels habitually stationed in one or two ports, consort each with some one woman. On the other hand the 'sampans' hanging about the ships and generally handled by women offer oppor-

tunities for promiscuous exposure. So the average conditions to which men serving on this station expose themselves may be regarded as similar to those in any other part of the world. The duration of liberty, which is an important factor in the present scheme, generally extends from one afternoon until the following morning."

The great prevalence of venereal affections among the Japanese and among sailors visiting the ports of Japan has frequently been cited to indicate the failure of medical inspection and segregation of prostitutes, but that these are valuable measures when properly administered is indicated by the comparatively fewer infections contracted in certain ports of the Philippines where police supervision is effective.

"The percentage of 'failures to report' upon refurn from liberty was 7.5. There have been monthly fluctuations in this percentage but the average for the last half year is about the same as for the first, indicating no improvement in this particular. This fact is to be regretted as 18.86 per cent. of the total number of venereal admissions is attributed to this cause. As this is one of the controllable causes that reduce the efficiency of the scheme, it should receive more consideration than it has. As already stated, men who fail to report are restricted 'for observation' for a period of at least three weeks. But it appears that this restriction and daily inspection are not sufficiently disciplinary to compel compliance with the order to report and more severe measures would seem to be indicated.

"The percentage of 'denials of exposure' was 67.75. There has been a constant monthly increase of this percentage, and this, or what amounts to the same thing, *a steady diminution of the number admitting exposure*, may have some ethical significance. The prominence given to the question of venereal disease by commanding and medical officers, the talks on personal hygiene, the institution of the prophylactic scheme in itself, have in the writer's opinion, been beneficial by bringing the better class of men to a greater realization of the evils frequently resulting from exposure, and by stimulating the latent moral sense. In any event, *there is no reason to think that a sense of security engendered by the scheme has caused any increase in indulgence.* The claim that the scheme will cause a greater number of concealments of disease has also been refuted on the *Charleston* by a recent examination of the entire crew, not a single case of concealed disease being found."

As an example of the still evident margin of danger of contracting an infection in spite of the prophylaxis used upon return aboard ship some hours after exposure the report from the North Atlantic Fleet for June and July of this year shows that out of 120,949 liberties, 5365 took the prophylactic treatment and of the latter number 105 developed disease; this represents .38% admissions of all liberties.

As the result of a year's experience and observation, Diehl felt justified in submitting the following conclusions:

"That venereal diseases can be almost entirely eliminated from the naval service by timely prophylactic treatment.

"That, since venereal diseases cause greater damage to efficiency and loss to the government than any other, nothing should be permitted to stand in the way of the general adoption of this treatment.

"That its efficient application is dependent upon departmental authorization and the co-operation and support of those in command and having disciplinary powers.

"That with such support and authorization the medical officer is responsible for the existence of venereal disease and that upon him must fall the opprobrium of its existence."

TABLE SHOWING MOVEMENT OF VENEREAL DISEASE IN UNITED STATES NAVY, 1880 TO 1909.

(Compiled by Surgeon C. N. Fiske, U. S. N., for Am. Public Health Assn.)

Year	Mean strength Navy and Marine Corps (Medical returns).	Total admissions for syphilis primitiva and consecutiva.	Invalidings from service by syphilis.	Deaths attributed to spyhilis.	Admission rate per 1000 (syphilis)	Admissions for gonorrhoea.	Admissions for chanchroid.	Aggregate primary infections.	Admission rate per 1000 for primary venereal infections.
1880	9,003	451	22	1	50.09	212	72	735	81.64
1881	9,546	403	18	1	42.21	213	108	724	75.85
1882	9,371	490	22	..	52.28	216	113	819	87.40
1883	9,197	340	29	1	36.96	252	93	685	74.48
1884	9,959	330	24	1	33.13	298	171	799	80.23
1885	9,191	279	19	..	30.35	370	181	830	90.31
1886	9,188	278	21	..	30.35	389	201	869	94.58
1887	9,618	244	11	..	25.36	396	167	807	83.90
1888	9,955	295	16	1	29.63	348	228	872	87.59
1889	11,219	310	18	1	27.63	316	118	744	66.32
1890	11,768	256	8	..	21.75	286	152	694	58.97
1891	11,501	198	19	..	17.21	284	100	582	50.60
1892	11,775	174	16	1	14.77	329	111	614	52.14
1893	12,109	171	14	1	14.12	304	60	535	44.18
1894	12,520	272	21	1	21.72	501	208	981	78.36
1895	12,671	239	14	..	18.86	330	152	721	58.48
1896	13,768	239	21	1	17.35	303	131	673	47.43
1897	15,229	270	29	1	17.72	323	136	729	47.87
1898	23,038	383	78	1	16.66	503	190	1076	46.71
1899	20,113	406	45	2	20.18	517	226	1149	57.13
1900	22,977	465	78	1	20.23	525	214	1204	52.40
1901	26,101	546	73	2	20.91	617	217	1380	52.87
1902	30,249	606	69	..	20.03	771	284	1661	54.91
1903	36,536	816	132	..	22.30	1032	396	2244	61.42
1904	39,450	880	125	..	22.30	1512	542	2934	74.04
1905	39,620	981	92	5	24.75	2085	538	3604	91.38
1906	41,690	1147	91	..	27.51	2640	733	4520	108.42
1907	44,083	881	105	1	19.98	2274	554	3709	84.14
1908	50,984	1001	116	2	19.63	3015	665	4681	91.81
1909	55,550	1476	166	5	26.57	5861	1573	8910	160.40

VENEREAL DISEASES AMONG SEAMEN OF THE MERCHANT MARINE.*

By J. W. KERR,
U. S. Public Health and Marine Hospital Service.

The impression prevails that venereal diseases are particularly prevalent among the seamen of the merchant marine. It would be of interest to know the exact prevalence of such diseases among seamen and whether they are in reality more heavily infected than are other classes of the population in the same social stratum. But it is entirely impracticable, by means of statistics, to estimate the percentage of infection among these employees, since the total personnel on American merchant vessels is not made a matter of official record.

The Bureau of Navigation, in the Department of Commerce and Labor, which has supervision over maritime commerce, keeps records only of shipments and discharges of seamen on vessels engaged in foreign trade, which does not include the army of employees in the coastwise trade and on the rivers and Great Lakes. Were the total personnel of the merchant marine known, it would be possible to determine approximately the percentage of the several venereal diseases among them, since the bulk of these patients are treated by officers of the Public Health and Marine Hospital Service, and made a matter of record.

As a matter of interest to the Association, the statistics of the Public Health and Marine Hospital Service have been reviewed, and the following is a statement of the number of cases of these diseases that have been treated in hospitals and dispensaries of the Service during the twenty-four years from 1886 to 1909, inclusive.

The table presented indicates that from 1886 to 1909, inclusive, there were treated 1,281,427 cases of sickness from all causes, or an average of 53,392 patients annually, Of the total number, 106,090 were cases of syphilis in one of the three stages, 4,420 plus being the annual average; 117,336 were cases of gonorrhoea (including gleet), representing an annual average of 4,889 cases; and 39,819 were cases of chancroid (including ulcer of the genitals) or an average annually of 1,659 plus cases.

*Read at 38th Annual Meeting, American Public Health Association, Milwaukee, September, 1910.

Year	Total sick from all causes	Total cases of syphilis treated	Total cases of gonorrhoea treated	Total cases of chanchroid treated.	Total cases of venereal diseases treated.	Per cent. of venereal to total diseases treated
1886	43,822	3,783	3,592	1,218	8,593	19.6
1887	45,314	4,344	3,654	1,088	9,086	20.0
1888	48,203	4,453	3,864	1,317	9,634	19.9
1889	49,518	4,794	4,004	1,342	10,140	20.4
1890	50,671	4,375	4,412	1,364	10,151	20.0
1891	52,992	4,934	4,473	2,019	11,426	21.6
1892	53,610	4,836	4,595	1,955	11,386	21.2
1893	53,317	4,962	4,708	1,807	11,477	21.5
1894	52,803	4,491	4,882	1,730	11,103	21.0
1895	52,643	4,688	4,607	1,403	10,698	20.3
1896	53,804	4,532	4,806	1,281	10,619	19.7
1897	54,477	4,671	5,301	1,476	11,448	21.0
1898	52,709	4,607	5,087	1,437	11,131	21.0
1899	55,489	4,256	4,951	1,364	10,571	19.1
1900	56,355	4,389	5,584	1,892	11,865	21.5
1901	58,381	4,324	5,447	1,977	11,748	20.1
1902	56,310	4,311	5,318	1,722	11,351	20.2
1903	58,573	4,093	5,854	2,123	12,070	20.7
1904	58,556	4,222	5,835	2,241	12,298	21.0
1905	57,013	4,607	5,618	1,754	11,979	21.0
1906	54,363	4,126	5,188	1,721	11,035	20.3
1907	55,129	3,761	5,185	2,215	11,161	20.2
1908	54,301	4,342	5,198	1,836	11,376	20.9
1909	53,074	4,187	5,173	1,537	10,897	20.5
Total:	1,281,427	106,090	117,336	39,819	263,245	
Annual Mean:	53,392	4,420+	4,889	1,659+	10,969—	20.5

The total number of venereal cases treated and classified as above during the period mentioned was 263,245, or an average annually of 10,969 (minus) cases. It will thus be seen that these venereal cases represented 20.5% of the total cases treated. This percentage, it will be understood, represents cases of syphilis, gonorrhoea and chancroid, and does not include complications or sequelae of those diseases.

On account of the nomenclature used, and because of the remote effects of venereal diseases, it was found impracticable to include complications and sequelae in the table presented. But among the total cases treated were 21,665 of adenitis and 1,609 of urethritis, or an annual average of 902 plus cases and 67 plus cases respectively. And since practically all of these cases were undoubtedly of venereal origin, they may be

included in computing the percentage of venereal cases to the total cases treated, thus giving 22.2% as the result.

Unless complications arise requiring hospital care, the beneficiaries of the Service are treated at out-patient offices, of which there are 147 located in different parts of the country. In common with other men of their class, seamen must work even though afflicted with venereal diseases, and are therefore obliged to apply for treatment as they go from port to port. For this reason a case may be reported more than once. It is probable that such duplications would in great measure counterbalance cases diagnosed as complications and sequelae and not counted, and 22.3 may be taken therefore as a fair percentage of the venereal cases to the total cases treated in marine hospitals.

This percentage is probably not greater than in many other civil hospitals and dispensaries that admit such cases. Morrow* refers to Fournier's observation that from 15% to 19% of all cases in the general hospitals of Paris were of venereal origin, and states as a result of his own investigations that more than 10% of all cases treated in the general hospitals and dispensaries in New York are of venereal origin. Further, Morrow quotes Lane to the effect that in every general hospital a great proportion —more than 33%—of the cases seen in the out-patients' department is of this nature. The statistics of the military services for 1908 indicate that the venereal diseases treated represented in the army 16.3% and in the navy 17.8% of the total admissions.

The ratio of venereal diseases to total cases treated by the Public Health Service has varied but little from year to year, the highest being 21.5% in 1893 and the lowest 19.1% in 1899. It may be concluded therefore that the prevalence of venereal diseases among sailors has remained constant during the past quarter of a century, and the same is probably true also of urban populations.

The reporting of the same case from different ports, as pointed out above, probably accounts also for the relatively greater amount of syphilis shown among seamen as compared with gonorrhoea, the ratio among our cases being as 1 to 1.1. Keyes† states that among enlisted men of the army the proportion of syphilis to gonorrhoea is about 1 to 5, and among his cases in private practice from 1 to 8 up to 1 to 15. But it is known that syphilis is much more prevalent among the submerged members of society in urban districts, and it is among this class that the average seaman is thrown when on shore.

* Morrow—Social Diseases and Marriage, p. 350.

† Keyes, E. L., Jr.—The Effect of Venereal Diseases on the Public Health, N. Y., Med. Jour., Jan. 1, 1910. p. 6.

The wisdom of affording relief to seamen is apparent. In the majority of instances the sailor is without legal residence, and he can but seldom avail himself of its benefits if he has one. He is unable to employ competent medical attendance, and the authorities of the ports at which he calls are not under obligation to afford it to him except in cases of dire necessity.

In the interest of maritime commerce, therefore, provision must be made for the protection of life and health of those conducting it, and by doing so seaman are assured of receiving expert advice and remedies in practically every port; they are protected from charlatans and quacks, and prevented in some measure from transmitting infectious diseases to their shipmates and others.

In the interest of the public health also, such provision affords opportunity of greater governmental supervision over the communicable diseases, including venereal affections. While absolute segregation of all cases of venereal disease is impracticable, those that are admitted to hospital are cared for under special conditions and instructed to observe rigidly the measures necessary to prevent the spread of the infection to others. In addition, opportunity is afforded to instruct out-patients regarding personal hygiene and the precautions that should be observed by them on going aboard ship.

PREVENTIVE MEASURES.

Like other members of society, seamen are ignorant of the dangers of venereal diseases and in addition they are generally irresponsible. For these reasons, and because of the high percentage of infection among them, measures of prevention are especially needed.

By reason of his mode of life and social relations, or lack of them, the sailor must be regarded rather as a victim of vice than the purveyor of it. Decrease of venereal diseases among seamen depends in a great measure, therefore, on the control of those diseases on shore.

At the present time there appears to be no hope of the eradication of venereal diseases, except through the discovery of specifics that will surely and speedily destroy the different infections in the bodies of those infected. The announcement of such a wonderful discovery in the case of syphilis encourages the hope that at last Ehrlich has found not only a cure, but an agent that will bring about the eradication of the disease. One injection of his remedy, "606," or dioxydiamido-arsenobenzol, is reputed to free the body from the spirochaetes of syphilis in less than twenty-four hours, and cure primary, secondary and tertiary lesions in two weeks or less. In that case the reservoirs of infection can be purified, and the disease eventually eradicated.

In the meantime, practical preventive measures should be decided upon and put in force, and of these EDUCATION is the most important, and of universal application. At the meeting of this Association held in Indianapolis in 1882, its committee, in reporting on the prevention of venereal diseases, stated:

> "Your Committee consequently repeat what they have urged in former reports, that the instruction of the community as to the existence, nature, and prevalence of venereal diseases is a necessary preliminary to successful legislation. They remind the association, therefore, that it is its duty, as the conservator of the public health, to disseminate that information concerning them which the science of medicine has established as no longer contestable."

That statement is as applicable today as it was when made 28 years ago.

The educational methods should be such as to teach the community. and not to offend or disgust it, and the mental capabilities of each class of society must be considered in selecting the facts to be taught; otherwise, there will be failure. Educational prophylaxis should include instruction especially regarding the relationship between alcoholism and social diseases.

With the view to the adoption of wise methods, there might well be held conferences of health officers, who, as a result, would unify and coordinate the efforts in their respective localities for the public good.

General hospitals and dispensaries should throw their doors open to venereal patients, and not only treat, but teach them. How can a self-righteous population expect immunity from these diseases and charlatans when it denies treatment to those afflicted, and even ignores the existence of such infections? In order to extend the influence of hospitals and dispensaries in the control of venereal diseases, it would be well if dispensaries were maintained at night and under official supervision. By this means those most in need would receive care and accurate records could be kept that would indicate in some measure the future legislative needs and their practicability.

The notification of venereal diseases would be of advantage, especially from a statistical standpoint, and would be practicable in the case of seamen treated in the service dispensaries. But the registration of cases of morbidity is probably the most difficult undertaking in preventive medicine and to be of practical value must be followed by prophylactic measures. When public opinion shall have been molded to permit of official supervision of such measures in the case of venereal diseases, the notification of those diseases will become a possibility. In the meantime, however, the requiring of notification would have an educational effect on the profession and community.

While segregation of prostitutes has been objected to on the ground that it is one-sided and therefore not a sound method of preventing venereal diseases, yet some official supervision is certainly practicable, and would be of benefit especially to the floating populations of municipalities, to which the sailor belongs.

Such supervision should include prohibition of street-walking and solicitation on the part of prostitutes, restriction of this class to residence in retired sections, the abolition of all signs indicating red-light districts in cities, the prompt arrest of all intoxicated persons found in such districts and the absolute prohibition of the sale or consumption of liquors in disreputable resorts.

Other measures that suggest themselves have been considered in the committee's report. It is not the intention, therefore, to discuss those measures in this paper. Reference may be made again however to the constant prevalence of venereal diseases among sailors, to the importance of their control, to the fact that such control is largely a matter of meeting conditions in municipalities and to the absolute necessity of an enlightened public opinion to bring this about.

A PLEA FOR APPLYING THE USUAL METHODS OF PREVENTIVE MEDICINE TO VENEREAL DISEASES.*

By J. R. KEAN,
Lt.-Col., U. S. Army Medical Corps.

The class of recruits now being enlisted for the army is, as has just been stated with regard to the navy, much superior in intelligence, education and character, to those of two decades ago, and they are far more carefully examined. Yet year by year, there has been a steady increase in the incidence of venereal diseases until, in 1909, they had reached the appalling figure of 14,640 admissions, representing 12,605 cases, and giving a rate of 197 admissions per month of mean strength. Naturally, therefore, the army is interested in this matter.

Metchnikoff, in his book, "La Nature Humanie," speaks of certain conflicts between the physical evolution of man and his social and moral development, to which he gives the names disharmonies.

The greatest of these is in the development of the reproductive instinct. This, which by the general law of nature is the most imperious of animal instincts, and which in man colors and influences both for good and evil the lives of all normal individuals, comes into activity about the 15th year, and by the 21st year is in the full vigor of its power. It is in natural man much diffused as regards the other sex, and he must be regarded as naturally polygamous by instinct and by development, while the natural woman is not so. The moral and religious laws of most creeds and societies set certain limitations to this instinct, though the disharmonies is far less in Mohammedan countries than in ours, where man is required to be strictly monogamous and where by the social requirements of this country, marriage is usually postponed for ten or fifteen years after puberty until his productive capacity is equal to the support of a family. Wherever this disharmony has existed in any age, race or stage of civilization, society pays the penalty by the appearance of prostitution. Many wise and good men have regarded this great evil as one inherent in the social fabric, and as it were, a necessary evil as long as the majority of men are ruled by their passions more than by their creeds. St. Augustine was of this opinion, and you will recall the sonorous periods in which Lecky, in his "History of

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

European Morals," states his rather extreme view of the role of the prostitute in society. For those who are willing to hear all sides of a question it may be worth quotation, especially as it is probable that before this Association gets through with the discussion of this matter, we are quite certain to hear some rather extreme views on the other side. Lecky says of the prostitute: "The supreme type of vice, she is ultimately the most efficient guardian of virtue. But for her the unchallenged purity of countless happy homes would be polluted, and not a few who, in the pride of their untempted chastity, think of her with a shudder, would have known the agony of remorse and of despair. On that one degraded and ignoble form are concentrated the passions that might have filled the world with shame. She remains, while creeds and civilizations rise and fall, the eternal priestess of humanity, blasted for the sins of the people."

I do not think, however, it is either wise or necessary for us, as scientific men, interested in the good of the race and of the country, to take any part in the discussion of the relation of this evil to society. It is sufficient for us to know the following facts: That the prostitute is a present and admitted evil; that there is no immediate prospect of her disappearance; that she is the most important agent in the spread of venereal diseases; and finally, that to diminish the spread of these contagious diseases we must exercise some control over this enemy of society, whose trade is directly responsible to a large degree for the spread of them. Even honest and useful trades which are injurious to health are so controlled by law as to prevent harm to the community, and shall this one be privileged to escape the control of the law because it is vicious and shameful? Is it logical or common sense to claim that the law legalizes it if the usual procedures of preventive medicine are applied to diminish so vast an injury to the public health? To the objections of the theorists that it is unjust to take legal steps against the woman and to let her male accomplice go free, the sanitarian replies that the distinction is made by nature—that it is quite impossible for the diseased male to be as active an agent in the spread of disease as the diseased female, and that the law should be so framed that males who make a profession of gratifying the sexual passions of others should be included as prostitutes. But it is again objected that no scheme of control can be effective which does not include the male prostituant and the clandestine female, as well as the recognized prostitute. It is true that we cannot hope by such means to stamp out venereal diseases, but we can do much to diminish them. Because our barrel leaks shall we knock out the bung instead of trying in every way to stop the leaks? Dr. Huici told us last year that as the result of the inspections in the city of Mexico for the 5 years ending in 1907, 7,778 cases of venereal

diseases of which 1828 were syphilis were sequestered in a lock hospital until the cure of the contagious lesion. Can any rational person doubt that these measures accomplished much in the way of prevention. The percentage of diseased prostitutes in Havana is less than 2%, while of those arrested as clandestinely practicing their trade without medical supervision the proportion found diseased is over 25%. The fact is that laws of this sort are like other laws; if they are properly enforced, they do much good, but if they are not honestly enforced, they fail.

Equally illogical are those unpitying moralists who, like the Pharasee on the road to Jericho, pass by on the other side, and proclaim that the road shall not be made safe to evildoers and that those who break the moral law deserve no pity for whatever befalls them. This attitude might find excuse if only the depraved and habitually licentious suffered. But not only we physicians, but the man in the street, knows that only too many among the bone and sinew of our land, men in every community whom we could ill afford to lose, have not always in the hey-day of their youth shown the self-control of Joseph.

"How many a father have I seen,
A sober man among his boys
Whose youth was full of foolish noise,
Who wears his manhood hale and green."

If the Pharasee shall say that these are not worth every effort to save from the blight of disease, what shall he say as to the great army of the innocents, the gentle wives, the young children, who must bear the sins of their husbands and their fathers.

The question of venereal prophylaxis is one in which the teachers of the Gospel of Christ, the sociologists and the hygienists are all equally interested, and they should fight the battle as faithful allies. Preventive medicine is last to come into the field, it is true, but we should not on that account hang timidly in the rear and follow in the footsteps of the older combatants, who though they have fought a good fight, have not yet victory in sight. Let us boldly use all the good weapons of science.

If a young man fail to control that passion which is a heritage of his physical being, it is a grievous thing, but it is a far worse thing for him, for his community, and for the race, if in addition he acquire disease. Let the physician, therefore, while advocating purity always, have also a word to help those who will not be pure; let him preach the gospel of cleanliness and prophylaxis of disease as is now being begun in military life. so that to the moral taint a physical one may not be added.

If our religious ally accuse us of robbing him of the weapon of fear of disease, we can point out mildly that if fear of evil consequences would control the passions, he would have won his fight in these 2,000 years without our aid, but that in a physical as well as a spiritual sense, love casteth out fear. It is a weapon unworthy of the armory of the Christian soldier.

The importance of early marriage in the prevention of sexual immorality and the spread of disease is obvious, but as the question is a social one we must leave it to our other ally, the sociologist. It is of interest to point out, however, that among our native troops the Phillippine Scouts, who are of different tribes, but as a rule married while young, these diseases prevail to only one-fourth the extent that they do with white troops. I am not able to give today statistics showing the success of the method of combating the spread of venereal diseases in the Army by a propaganda of instruction on the subject and by the use of preventive applications on the part of those who are uninfluenced by moral considerations, because it has not yet come into general adoption or received hearty support on the part of the military authorities. At a few posts, however, where it has been taken up by medical officers with the enthusiasm that an educational propaganda demands, and where the cordial support of commanding officers has been obtained, the results are very gratifying. These procedures have met with much success in several of the European armies and I hope in the future our army will follow the example so well set us by our sister service of the Navy. The matter will be somewhat fully discussed in the forthcoming report of the Surgeon General.

He has said with reference to the figures given above: "The venereal peril has come to outweigh in importance any other sanitary question which now confronts the Army, and neither our national optimism, nor the Anglo-Saxon disposition to ignore a subject which is offensive to public prudery can longer excuse a frank and honest confrontation of the problem. There is no reason to think these diseases are beyond the reach of preventive medicine any more than other contagious diseases, and their immunity from restriction must be attributed to the public disinclination to discuss them and legislate concerning them."

Now I think that your Committee has given you what the Surgeon General calls a "frank and honest confrontation of the problem," and it is my hope that this Association will not be deterred by the outcry of certain classes of persons who are accustomed to think with their emotions rather than their brains, from taking the bold stand in this matter which is justified by science, by common sense, and by the demands of the public good.

DISCUSSION.

Dr. Gardner T. Swarts, Providence, Rhode Island. As President of the Association last year, I took the liberty of asking for the appointment of a committee to take up the subject of venereal prophylaxis. The suggestion was made with the idea that the people of the country were prepared to receive instruction on the prevention of gonorrhoea and syphilis; a matter of extreme importance not only to boards of health but more particularly to the people at large. I think the time has come when we should dispense with all Puritanical prudery and cease to discuss these subjects behind the screen. By withholding information of these diseases or by discussing them in a secret or mysterious way, many young people are led astray through ignorance, and it does seem proper, if boards of health are appointed for the purpose of conserving the public health, that they should undertake to enlighten the public in regard to these matters. Here are two communicable preventable diseases which have not been placed on the list even of reportable diseases excepting in a few instances. If these two diseases are preventable, why are state boards of health so negligent in doing their duty? If seventy-five per cent. of the laparotomies performed on women in hospitals for the removal of the tubes and appendages are the result of ignorance on the part of those infected, and if operations as the result of these diseases are performed on women in the best class of society in our New York hospitals and elsewhere who have been infected by their husbands and no one else, some one is to blame, some one is negligent in the performance of duty. If the boards of health are to conserve the public health why is it not their duty to take up this subject? If any clergyman or philanthropist discussed this subject in a fearless manner he would be spoken of as a faddist and as one running to extreme opinions. But boards of health can consistently take up these subjects and I believe it is their duty to discuss them freely and thoroughly and to carry on a crusade similar to that which has been conducted in a campaign against tuberculosis. I believe good results can be accomplished in that way. If the morbidity statistics on these two diseases are in excess of double that of tuberculosis, why are we not active?

We have had the report of the committee and have had the benefit of application of knowledge in regard to these matters in a military way whereby results have been obtained. In the report of this committee you will notice there was an objection raised by a minority. The reason of that objection was based entirely upon the one section in the last paper

which calls for the segregation and examination of prostitutes. Men are not mentioned in that recommendation and the reason of the minority for not so recommending is that they do not believe at the present time it would be a good policy to introduce so strong a measure. I believe it is not good policy to introduce into this movement anything except the question of education at present. Leave the whole question of morals and control to the public authorities except so far as education may serve as a cautionary measure.

Through the efforts of this Association we can educate the people as to the communicability and preventability of these diseases, and I believe such a campaign can be carried on systematically with good results. I trust some way may be found by which we can put into the hands of members of state boards of health the machinery whereby this can be brought about.

We find other associations are taking up subjects which we should have taken up long ago. Are we going to be second in this matter? I hope not. An American Federation of societies interested in the prevention of social diseases was formed in St. Louis a few months ago. I think this Association ought to become a co-operative body. If we are to be the ones to place standards for boards of health and other societies which shall amalgamate with us for social control of health matters, it behooves us to show activity. The subject is one which I hope the members of this Association and of every state board of health will take up in a practical way. I hope we shall be able to have the committee continued.

Dr. Joseph S. Neff, Philadelphia. This subject is one of the most important that has been brought before this convention. The responsibility has been thrown upon health officers to solve the problem; one which is too complex to be covered by a limited discussion at a meeting of this character. I thoroughly agree with the preceding speaker that all health officers and all state boards of health should indulge in an educational campaign, as I believe the solution is in work of this character.

I want to add a word of warning before this Association takes seriously into consideration the adoption of that part of the report recommending the compulsory registration of venereal diseases. I do not think it is practicable or possible. No law can compel physicians to reveal the secrets of his patients and he will not report this class of diseases. If the private physician will certify that death caused by acute alcoholism was produced by cerebral congestion or hemorrhage, omitting all evidence as to the cause of that condition, he will certainly cover up the cause of death when due to venereal disease.

In the large cities with which I am familiar, statistics on these diseases are valueless, as true returns are made only from so-called "Poor Hospitals," city institutions and slum districts. Should laws be passed placing venereal diseases in the list of those reportable, physicians would become so accustomed to violating the same in this particular, that they would violate them in toto and lessen the registration of such diseases as scarlet fever, diphtheria, typhoid fever, etc. The prompt reporting of these latter diseases enables the public health officials to prevent the spread of contagion and terminate or ward off epidemics and nothing should be permitted to lessen this requirement.

There are other reasons, did time permit, that could be enumerated, but for the reasons stated, I think it would be unwise at present for the American Public Health Association to go on record as adopting that portion of the report recommending compulsory registration of venereal diseases.

Dr. M. W. Richardson, of Boston. The Massachusetts State Legislature at its last session required the state board of health to provide an outfit for the prevention of ophthalmia neonatorum and to decide what should be considered a proper prophylactic. As a result a one per cent. nitrate of silver solution was recommended and distributed within a dropper. With the dropper is sent out a circular telling how the prophylactic is to be used. The cost of this outfit, ready to mail, is eleven cents and in this respect is somewhat cheaper than the Rhode Island outfit, although, I think, a little more expensive than the New York outfit. In this Massachusetts outfit, moreover, there is enough nitrate of silver solution to last a physician for six months, or possibly a year. The cost of renewal is, therefore, very small.

Dr. John N. Hurty, Indianapolis, Indiana. I believe the road leading to the prevention of venereal diseases is the longest and roughest road which hygiene and sanitary science has to travel. The tuberculosis problem is not so large in comparison. At this time, every nation, every tribe, and all the peoples of the earth are thoroughly syphilized. Think of that—syphilis everywhere upon the earth and we are now proposing education to eradicate it. So far as I know the first man to propose education to eradicate this disease was Solomon. He started the work five thousand years ago; yet in the face of the education he gave, and such as we propose to give and continue giving, venereal diseases have increased and multiplied. I therefore have not much faith in education as some seem to think it is entitled. Solomon said the scarlet woman leads down to hell.

It has been told the people for thousands of years, yet men, under the impulse of sexual desire, go down to hell and will continue to go, if we apply education the way we have been applying it all of these thousands of years. I think the right place to apply anti-venereal education is with the child. There is little good to present this story to the boy after he has arrived at the age of puberty. It is then too late. His sexual nature has not been under control and he will not then control himself.

Many of us here are teachers in medical colleges. We know that medical students sit before us, listen to the horrors of the venereal diseases, and subsequently go out and yield to the solicitations of the street walker, later coming back and asking us, their preceptors, to treat them. This is going on all the time in every medical college to a greater or less extent. Education that is applied to the adult for this purpose, amounts in my opinion to nothing, and until we put aside that prudery which now prevents us from attacking the problem correctly and which prevents us from teaching the child about his sexual nature and about procreation, we can make no progress. The most important knowledge you can give the child is knowledge of his sexual nature and under present conditions this is absolutely denied him. But he acquires that knowledge finally in the most abominable and wicked and horrible manner possible. Instead of being instructed in childhood, honestly, with dignity, and with purity, he is not instructed at all, but allowed to shift for himself. It is the most important of all instructions and should be given before the age of puberty.

As for definitely reporting these diseases, that is out of the question. Dr. Neff said that you cannot compel a physician to report venereal diseases. Furthermore, you cannot expect syphilized legislators of the United States to pass laws in regard to that disease. You will find syphilis and gonorrhoea existing among the members of the legislature as well as elsewhere and laws on the subject are thus entirely out of the question. We cannot think of reporting these diseases at present. We should commence instruction of the child, and it seems, it will be some time before that can be done. It will be a long time before our first steps are taken in that direction.

As to boards of health taking up this subject: The State Board of Health of Indiana entered into a contract with a lecturer to go over the state and lecture upon these subjects. He has done this and has been in numerous towns and I have talked upon the subject to numerous audiences myself. About three hundred lectures have been delivered upon this subject to private audiences. We have lectured to high school students, ladies' organizations, civic organizations, and young men's christian associations. We have in the meantime distributed almost

forty thousand circulars upon the subject and we have a new addition of twenty-five thousand copies to distribute; but I doubt the utility of all of that work except to prepare the public minds for the introduction of instruction in sexual hygiene and the horrors of the venereal diseases to children.

Dr. George M. Kober, Washington, D. C. I appreciate the force of the objection made to certain of the recommendations. It seems to me, however, speaking for the committee, that as a national organization on public health, its committee would have been remiss in its duties had it failed to present less radical measures, and I trust the Association will endorse all the recommendations calculated to reduce the ravages of these diseases to a minimum. If Dr. Neff and Dr. Hurty believe that notification of other communicable diseases will help to locate the sources of infection and serve to prevent their spread, they should declare in favor of compulsory registration or notification in venereal diseases. We should certainly favor any method that will help to diminish their spread and that can only be done in these diseases, as in all other communicable diseases, by locating the sources of infection. We can never hope to stamp out germ diseases until we locate the sources of infection and prevent the dissemination of the germs. This, in brief, is the answer to the objections that have been made. We have tried this method in the control and management of other communicable diseases, and this association should manifest sufficient moral courage to attack this question in the right spirit and in the right way. The substance of this report was presented before a gathering of health officers in Vermont, composed of medical men and laymen, and never was more enthusiasm manifested than in this so-called Puritanical audience. The local papers devoted two and a half columns to the presentation of the subject. The discussion was led by a Congregational clergyman and among other educational measures he was prepared to advocate hereafter that no marriage should be inaugurated unless the man and woman had been subjected to a physical examination. If a clergyman or layman can take that stand it seems to me the members of the American Public Health Association need not hesitate to endorse the recommendations of the Committee.

Dr. Charles N. Fiske, Washington, D. C. Colonel Kean has referred to the steadily rising admission rate for venereal diseases in the army. I would not have the members of the Association think that this represents the true incidence of venereal disease in the navy during the last twenty years.

It is only apparent incidence. Doctor Kerr has shown that the proportion of venereal diseases to all affections for which men from the merchant marine are admitted to marine hospitals has hardly varied in 20 years, and it is evident that from the far better class of men in the navy the true curve of incidence (not of admission) must have been fairly horizontal. At any rate, it is now falling instead of rising. Our admission rate is probably not less than two hundred per thousand per year. But in another year I hope to have also a curve which cannot be constructed now of the results of education which will show a decline in the percentage of men exposing themselves to infection.

Dr. J. W. Kerr, Washington, D. C. The subject of official control of venereal diseases has not heretofore claimed much of my attention, and I felt great hesitancy in accepting an invitation to take part in the symposium. It was thought, however, that the statistics might furnish some idea of the general incidence of those diseases during the past quarter of a century, and they are presented for what they are worth.

The recommendations of the committee I concur in and believe if it were possible to carry them out there would follow a marked diminution of venereal diseases; at the same time, I recognize the great difficulties involved and the practical impossibility of enforcement of some of them by health authorities.

As to notification, as stated in my paper, it is greatly to be desired and would be entirely practicable in cases of seamen of the merchant marine treated in our dispensaries, but whether it is possible for local health authorities to enforce it, is for them to decide. In principle, notification of venereal diseases is correct. We should have complete morbidity statistics of all diseases, but this is not possible at the present time even in the case of smallpox, a disease which everybody fears, and to which no stigma is attached, its statistics not being complete in practically any state in the Union. Health authorities will be able to overcome the difficulties only after the attitude of the profession and the public with respect to venereal diseases has been changed.

In determining as to whether registration or licensing of prostitutes shall be recommended, the question of expediency is to be considered. If experience in other countries has shown that it is practicable, and if it will not retard rather than advance the propaganda for the control of venereal diseases, I would urge by all means that our health officers enforce it within their jurisdictions. But there are those who hold that in those cities where it has been most thoroughly tried, clandestine prostitution is most in evidence.

Dr. Jefferson R. Kean, U. S. Army, Washington, D. C. The Association wants from its committee a clear-cut recommendation as to the scientific measures that are necessary. I think the question of expediency should be applied, not by this Association, but by the health officer who will take what he wants of the recommendations and carry them out, and leave what is not expedient. Who can decide that a recommendation for the registration and inspection of prostitutes is not expedient in some communities. Who can tell but that the state of Arizona might put such a thing in its constitution? It is a common-sense measure where it can be carried out. It can be carried out in some communities. I have seen it carried out and it was not carried out by military power. The only military part of it was an honest intention to obey the law on the part of the sanitary officer, and that will be found in civil as in military life. It has been done in a number of towns in the Philippines. It has been done fairly well in Havana, Cuba, and it has been done in other towns I might name. Therefore, it seems to me this Association should take the steps which are theoretically necessary and recommend them for the consideration of sanitary officers, and the sanitary officers should have consultation with their municipal authorities and feel the pulse of their communities and decide what is expedient and what is not. We cannot tell how far this may go. Who knows but what a recommendation which may seem inexpedient today may later on be adopted? Therefore, I hope the association will take the recommendations *en bloc* and not apply the test of expediency to them at this time.

Laboratory Section

THE BACTERIAL CONTENT OF SEPARATOR CREAM AND SEPARATOR MILK.*

By P. G. HEINEMANN AND E. CLASS.

In a previous paper† attention was called to the relatively low bacterial content of separator cream as compared with the content of the milk from which the cream was separated. It was also noted that the number of bacteria in the separator milk was higher than in the original milk. The cream contained nearly 38% fat and this was the only cream worked with. The experiments led to a more complete investigation under more favorable laboratory conditions and this investigation was carried on during the first six months of the present year. The object of these experiments was to determine whether the amount of fat in the cream bore any relation to the bacterial counts and also whether a definite relation could be established with the bacterial content of the separator milk. We are indebted to the DeLaval Separator Company for the loan of a small hand separator to carry out the experiments.

METHODS.

Three quarts of bottled milk were purchased daily from various dealers. The three quarts were mixed in a scalded vessel and heated to 35° C.; suitable dilutions were then prepared and 1 c. c. of these dilutions plated in 1% glucose agar of 1% acidity to phenolphthalein. The separator was then washed with boiling water and the water allowed to run off as completely as possible. The milk was then separated and the first 300 cc. of the milk and the first 50 cc. of the cream discarded in order to eliminate the error caused by the small amount of water remaining in the separator. The cream and milk were then collected from the separator and dilutions of these prepared and plated in the same manner as the whole milk. All plates were incubated at 20° C. and the colonies counted after three days.

The amount of butterfat of the whole milk, the separator milk, and the cream was determined by the Babcock method and the results recorded. With few exceptions the separator milk contained practically no fat.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

† On the Production of Sanitary Milk, Heinemann, Luckhardt, and Hicks. Jour. Infect. Dis., 1910, 7, p. 47.

The amount of butterfat in the cream was regulated by turning a certain screw which controls this factor. Thus it was possible to obtain cream of approximately the desired fat percentage. The 99 tests made were divided into nine groups according to the fat content of the cream. The first group contained 16 to 20% fat, the second group 21 to 25% fat, and so on, each group being limited to a variation of 5% fat, excepting the ninth group, which contained all samples with more than 55% fat.

The accompanying chart shows the results graphically. The numbers of colonies in the cream and separator milk are reduced to a basis of 100 colonies per cc. of the whole milk.

The results of the investigation as far as the cream is concerned show that the number of bacteria are less than in the whole milk, and that the relative numbers decrease with an increase of fat. This is readily explained if we assume that the bacteria move towards the periphery of the separator during the process of separation; the higher percentage of fat the longer the cream is held in the separator. The longer the cream is held the greater are the chances for the bacteria to move away from the center with the centrifugal force.

The larger number of bacteria in separator milk, when cream of a relatively low fat content is separated, is probably due to the breaking up of clumps and chains, so that a larger colony count is obtained. We are, however, at a loss to explain satisfactorily the decreasing relative numbers with increasing fat content. The skim milk is held in the separator for shorter periods as the cream is held longer, or as the percentage of fat increases; that is to say, the total outflow from the separator of cream and milk combined is practically the same, no matter what the fat content may be. If the flow of the cream is less in quantity then the flow of the milk is larger in proportion, and the speed of the separator the same. The increase of volume of the skim milk is small, however, and is probably negligible.

CONCLUSIONS.

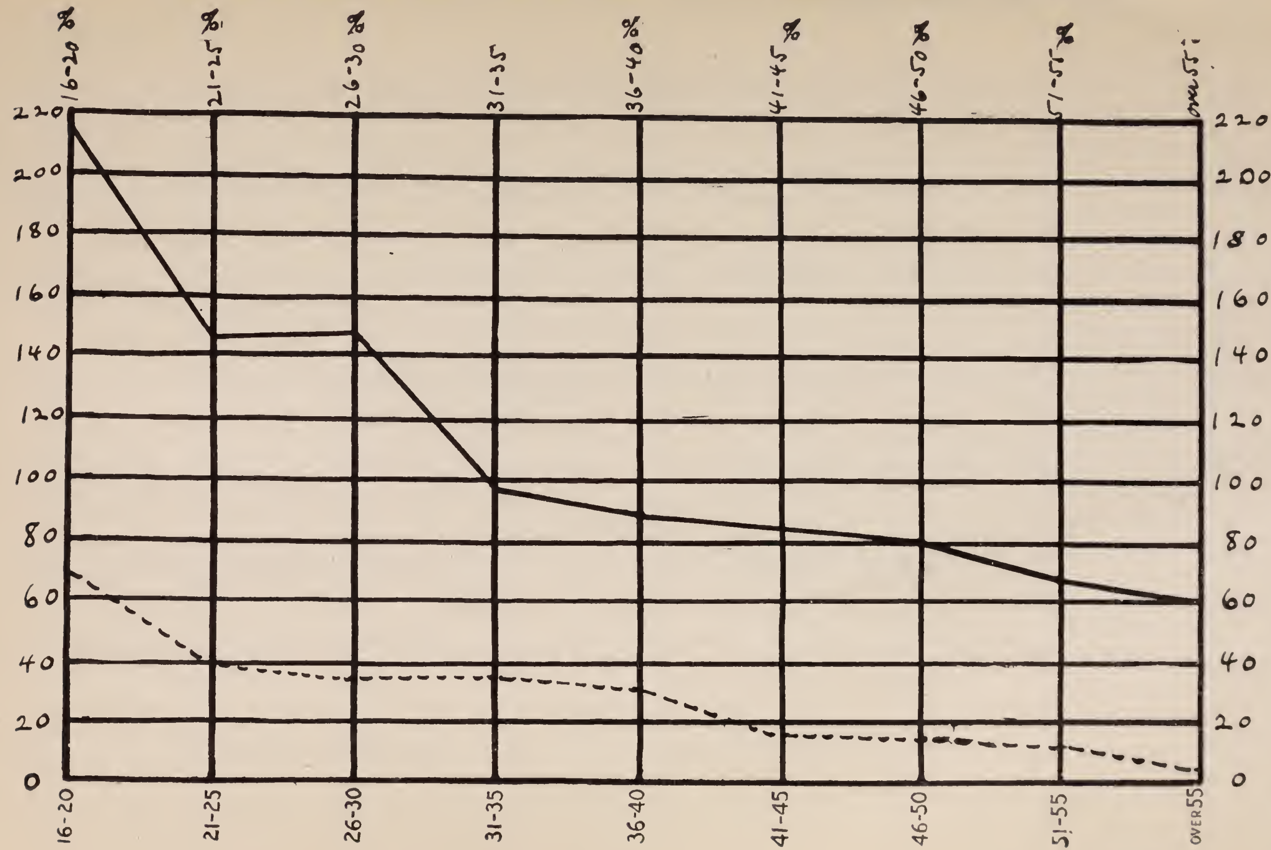
1. Separator cream contains smaller numbers of bacteria than the milk from which it is obtained.

2. The number of bacteria in separator cream decreases proportionately as the fat content increases.

3. The number of bacteria in separator milk is larger than the number in the milk from which it is obtained if the cream contains up to about 35% fat. Above this percentage the number is smaller.

4. The number of bacteria in separator milk decreases proportionately with the increase of fat in the separator cream.

Chart showing relative number of colonies in Separator Cream and Milk. [illegible] ...oers of colonies,
Abscissae represent percentage of fat in cream. Solid line = Skim Milk; Broken line = Cream.



Section of Municipal Health Officers

EPIDEMIOLOGY OF DIPHTHERIA, SCARLET FEVER AND MEASLES.*

By H. W. HILL, M. D.

These three diseases show many points of similarity in the mode of spread.

To begin with, and although we know the specific infective agent of one only—diphtheria—we are justified in believing that all three are dependent for origin and transmissibility on the existence in the body of the infected person of living organisms, as specific and definite in the cases of scarlet fever and measles as in the case of diphtheria, although not necessarily of the same biological division.

We are justified in believing that all three diseases are spread by the transmission from one person to another of these infective agents, and that the primary vehicle in which they are carried is in all three diseases the same, i. e., the discharges of the naso-pharnyx principally. Hence the three diseases fall under the general statement that infectious diseases are spread in general from one or more orifices of the body to one or more orifices of the body (usually the mouth) in the discharges, normal or abnormal, of those orifices. Of course there are instances where infectious diseases are spread from orifices to abraded skin surfaces, and vice versa, but in general all the infectious diseases of this part of the world fall fairly well under this rule. Certainly it is true of diphtheria, scarlet fever, and measles, the orifices concerned both as infecting and as infected being of the nose and mouth.

We assume that the skin in diphtheria has little to do with the spread of diphtheria except as the skin of the lips and hands, particularly, become infected with the discharges from the naso-pharnyx. I think the same assumptions equally likely with regard to scarlet fever and measles. The scales in scarlet fever, except as they may become infected with and carry the mouth discharges are probably harmless.

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

Granting these hypotheses, the methods of spread in all three diseases vary merely with the possible methods of carriage of the mouth discharges, in mass, as in the form of sputum, or droolings, in finely divided state as in mouth-spray, and in the form of smears upon the skin or on articles which come in contact with the patient. Here again the analogies with other infectious diseases holds good.

Probably none of these forms of infected matter maintain their infectiveness (i. e., maintain their specific organisms in a living condition capable of reproduction) for any great length of time, the length of time in any given case, in the absence of actual disinfection by heat or chemicals, depending on the exposure to light and the extent of drying. On account of the stickiness of bacteria in themselves, but particularly on account of their suspension in the more or less mucoid, often albumenous, discharges from the naso-pharynx, the drying of the discharges upon articles usually terminates any great danger of further spread since it is difficult to remove the material thereafter without considerable effort—as the housewife finds in trying to take finger marks from furniture.

Hence these diseases seem to be spread chiefly by fresh recent moist discharges, by mouthspray only directly from mouth to mouth, by massive discharges (of sputum or droolings) from mouth to mouth, or from patients' bedclothes or hands to attendants' hands and mouth. Smears originate chiefly through the patients' or attendants' hands, and it is by smears chiefly, and chiefly those on hands, that a wider radius of action obtains.

The moment the mouth of a well associate becomes infected by mouth spray or hands, the radius of spread is much extended both as to time and place. New cases springing up quickly and close to an original case may be due to any form of infection, but cases developing later on and at a distance are chiefly due to throat infection of attendants, without development of the disease.

This form of throat carriage is realized most clearly in diphtheria. It is less well established in scarlet fever and usually held to be non-existent in measles. However, the infection of attendants' throats in measles must occur, if our hypothesis of the chief seat of infection be correct, exactly as in diphtheria and scarlet fever and if it be true, as seems generally accepted, that measles is not conveyed by a third person, some as yet unknown factor, tending to destroy the infective agent in insusceptible throats, must be at work.

The infectivity of the patients in the three diseases before and after the acute attack varies. Thus diphtheria is undoubtedly infective from the moment the germs enter the throat, until perhaps months later they

leave it again. Scarlet fever is infective perhaps for a similar period; the evidence, however, is less conclusive and usually the infectiveness is dated from the earliest prodromes up to a wholly indefinite and indeterminable period, the bounds of which in practice are set more or less accurately by the restoration of nose and throat (and other affected parts) to normal. The attempt to correlate infectiveness after recovery with the desquamation seems definitely a failure.

Measles, on the other hand, would appear to be absolutely uninfective during the nine days of incubation; its post-lesional persistence is unknown, but probably short. Judging from the fact that insusceptible throats seem incapable of carrying the infective agent, it would appear likely that a measles case becomes non-infective as soon as insusceptibility is established, i. e., immediately on recovery from the acute attack, and that like scarlet fever, the desquamation does not correlate in any way with the infectiveness. At all events, recovered measles cases do not seem to remain infective as do recovered diphtheria and perhaps scarlet fever cases.

It is a pity that the light regard in which measles is held, the immense numbers of cases where no physician is called and the practical impossibility of carrying out restrictions makes this disease difficult of epidemiological conclusions, for it has features not only peculiar and interesting but susceptible of definite study not presented by the other two diseases.

The handling of all three diseases is the old problem of preventing the interchange of human naso-pharyngeal discharges—that exchange which goes on continuously day and night, everywhere, greater here, less there, but hardly ever entirely absent, by mouthspray, sputum and hands. This is the problem as well of tuberculosis, of pneumonia, of whooping cough, of chickenpox, of smallpox. In a broader form, the problem of infectious diseases is the problem of the exchange of human discharges of all kinds. Certain broad general lines may be laid down however for the control of these diseases; their prevention will never come until the exchange of human discharges ceases.

In brief the methods are:

1. To detect and isolate as many as possible of the actual cases, for it is from these that infection, carriage by mouthspray, drool and hands chiefly radiates, i. e., the quick acting direct forms of transmission. A perfectly isolated patient ceases, during isolation, to radiate infection.*

2. To detect and isolate or otherwise control the insusceptibles who may have throat infection without lesions. These can be detected in dipthheria alone with any certainty and by culture only. In the other

* See Chapin—Sources of Infection—pp. 156–160.

diseases they cannot be found as yet. Therefore all that can be done in these diseases is to watch susceptible contacts for the earliest signs of the disease in question, as only thus can the fact of infection be established.

Theoretically, if the patient and every person who might have received infected discharges from the patient could be isolated, each by himself, and so kept under observation while being prevented from securing new infection or spreading further that which he might already have, the prevention of epidemics would be a simple matter. Practically this is impossible. The infectivity of patients, theoretically so enormous, practically worked out only a small percentage of efficiency.

We need an efficiency of over 50% in our work to get definite results, but fortunately, 100% is not demanded. I presume if we had daily medical inspection of every member of a community the spread of ordinary infections by contact would cease, although water, milk, food, flies, etc., would occasionally have their say. That this is no mere vision is shown by the fact that the health officer, troubled by summer outbreaks of diphtheria and scarlet fever actually looks forward to the opening of the schools where daily medical inspection is possible, as the beginning of the end of his troubles.

I am aware that I am opposing some of the modern teaching regarding "carriers" in thus stating my belief that the detection of cases is after all the important point, but I think I can show reasons for this.

The organisms are more abundant and more constantly present during the period of disease than in any like period of the average carrier.

The average carrier is less continuously and intimately fussed over, cared for, touched, handled, helped than the average patient, hence less likely to transfer discharges to others.

The average carrier is stronger, more active, more outdoors than the average patient, hence his discharges are hardly handled directly by third parties and his minor discharges tend to exposure to sun and light.

"Carriers" in diphtheria at least would seem frequently to remain carriers for short periods only.

Finally, if carriers, abundant as they are at times, were in fact as infective as patients, the race would long since have disappeared.

I do not intend to minimize the effect of carriers (a) in accounting for "sporadic" outbreaks, i. e., where no initial case can be traced; (b) in accounting for occasional small outbreaks within the limits of ordinary contact, multiplied excessively if that contact be multiplied, as in infection of milk; (c) in spreading the disease from sick persons to others through temporary "carriage."

Section on Vital Statistics

THE IMPORTANCE OF THE REGISTRATION OF MARRIAGE CERTIFICATES.*

By DR. F. W. SHUMWAY,
Secretary, State Board of Health, Lansing, Mich.

The purpose of this subject assigned to me is, I assume, to draw out discussion upon the importance of registration of marriage certificates in its relation to public health work and also to the establishment of personal and legal rights of the individual parent and the individual child. I believe it will be profitable to view the question from three different standpoints: (1) what constitutes efficient registration of marriage certificates; (2) what benefits are to be derived; (3) and what do present and on-coming problems suggest as practical additions, improvements or reforms in registration of marriage certificates.

The institution of marriage is of divine origin and without question the very foundation of our social organization, and any and all influences that affect that institution are of vital concern to us as a people and a nation. Not only for the sake of reliable statistics to us in conserving the health of our people, but also for the protection of the personal and legal interests of the citizens of the state and their children, is it therefore important that every marriage be properly placed on record together with all important facts in connection with the same that will insure identification of the parties contracting the marriage.

In order to bring out some of the salient factors that constitute efficient registration of marriage certificates, I ask your leave to review the main facts regarding marriage records in Michigan. Owing to the slowness with which returns are made to the State Department, the data I shall give is only brought down to and including the year 1908, that of last year not yet being compiled. There were 25,765 marriages returned to the State Department as having occurred in Michigan during the year, 1908. This number corresponds to a marriage rate of 19.5 married persons

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

per 1,000 estimated population. This rate is slightly less than for the year preceding, 1907, and in fact is lower than for any of the five years immediately preceding, as is shown in the following table.

Year	Number	Rate
1903	26,029	20.8
1904	24,518	19.7
1905	26,307	20.6
1906	27,519	21.3
1907	27,940	21.4
1908	25,765	19.5

The average marriage rate for the ten years immediately preceding the year 1903 was 17.6 per 1,000 population, which is perhaps about the correct normal rate in Michigan rather than some of the higher rates given above, for, in comparing the rates at the present time with previous years of registration, especially with the years previous to 1899, further analysis of the figures should be made, and account taken of abnormal conditions which pushed the marriage rate of Michigan beyond what it should really be. During the season of 1899, and since that time, enterprising clerks of one of the counties of Michigan, situated on the south-eastern shore of Lake Michigan, went into the wholesale issuance of marriage licenses to non-residents, finding a market chiefly among the residents of Chicago, and interior points of Indiana and Illinois, who came to St. Joseph City, Berrien County, in immense Sunday excursions. If I remember rightly, some such industry was flourishing at about that time right here in Milwaukee, conducted by "runners" and alleged "ministers of the Gospel." Fortunately the Wisconsin legislature put a stop to this practice, but it yet remains for the Michigan legislature to follow the example set by Wisconsin. As a result, hundreds of marriages of non-residents have been added to our Michigan statistics, and Berrien county in which this industry exists, should be excluded from all final compilations of marriage rates, for I believe that the fact of including this county has increased the marriage rate in Michigan very materially for the past ten years, thus running it above the normal average which would be somewhere around 17.6 per 1,000 population. Here, then, is one factor which should be corrected: the prevention of marriage of non-residents inflating the marriage rate of a state.

The Michigan statutes provide that clergymen or justices of the peace solemnizing marriages shall make their returns to the County Clerk, within ten days thereafter, but in spite of the efforts of the Department of State and many of the County Clerks, this provision of the law is not observed as it should be. Its enforcement is weakened from the fact

that there is no way of ascertaining what clergyman or justice of the peace performed the marriage ceremony until the return is made and therefore the County Clerk cannot know where to address in case of delinquency. A plan adopted by many County Clerks of Michigan is to ask the applicant for a license, who is to perform the ceremony, and endorse the name of the clergyman or justice of the peace on the affidavit, then, if a return is not duly received, a letter is sent to the person who performed that ceremony, asking him for the record; in this way many delinquent returns are received. Another method is for the Department to send a letter to the groom, asking name and address of the person who performed the ceremony, resulting also in completing the records. I believe in this connection it would be of great help if marriage licenses had a time limit in which they could be used, instead of being, as at the present time, entirely indefinite in this respect. For example, there are hundreds of licenses that have been issued in Michigan still valid upon which no return has been made to the County Clerk and concerning which it is impossible under the present system to say whether any marriage has been performed, and if so in what year. A license, for instance, may have been issued in 1909, but for some reason the marriage did not take place. This same license would be sufficient for the marriage of the parties during this current year; but the record of the license would appear in the County Clerk's transcript of 1909; and would be carried as an open license since that date. As a rule returns are not received after the lapse of a year, but sometimes returns of marriages on old licenses are received, and it cannot be certain in any case whether the marriage was not performed soon after the issuance of the license and the return failed to be made as required by law. Therefore, I believe a time limit would enable the recorders to check up delinquent returns more sharply, and keep the yearly records more consistent, besides insuring the record of every marriage.

The registration of marriages in Michigan has been observed since 1867, and all things considered, I believe I am safe in saying that fully ninety per cent. of marriages are now properly recorded.

Ever since the day of William Farr, the marriage rate has been recognized as a safe indicator of social conditions. It is the barometer of prevailing conditions; during hard times or economic pressure, the marriage rate decreases; during prosperity, it increases. It fluctuates according as wages are adequate or not. Thus from the proportionate number of marriages at a given time we may read the welfare of the people at that time. Another important study of marriage statistics is to learn whether in general people are marrying earlier or later in life; the age significance. This has an important bearing upon social questions; whether marriage is being

postponed to later years; the probable duration of joint lives of husbands and wives; the span of home life, etc.

Doubtless one of the most practical uses of marriage records is the establishment of legitimacy of birth and the matter of inheritance of property. Upon accuracy and precision here hinge legal decisions, material prosperities of whole families, justice.

Thus we see that the benefits derived from accurate registration extend to the very core of our social welfare—our home life.

Do the public health problems of today, and do considerations for the future, urge that registration of marriage should include facts concerning the fitness of persons contracting marriage? Are not guardians of the public health wondering how long it will be before this question will be as practicable and as faithfully inquired into as is consanquinity today? It would be of incalculable value in the solution of some of our most pressing problems, to know whether or not alcoholism, insanity, epilepsy, tuberculosis, syphilis, cancer or some known tendency to crime menaces the physique and efficiency of a person about to enter the state of matrimony and take upon himself the responsibility of a family. Is it not the duty of the state to take forethought of its welfare and to inquire: Is this marriage plainly going to bring upon the state charges who can neither support themselves nor be safely at large? Who must be cared for or restrained at state expense? Now Michigan has on her statute books a law prohibiting marriage of any insane person, idiot, or person afflicted with syphilis or gonorrhoea; yet what is there to certify that applicants for marriage have observed this provision, or are fit as regards these afflictions? A certificate from a reputable physician should be filed with the County Clerk, or with State officials, showing that this provision of the law is duly observed. The protection of the public health, the maintenance of vitality of the nation, the continuance of the race, demands that such a law as this be made and enforced and duly certified to in records of marriage.

Notes and Reviews*

PUBLIC HEALTH NEWS AND NOTES.

By B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Massachusetts.
(*Reviewer.*)

Bacterial Milk Examinations in Cincinnati. In the annual report of the Department of Health of Cincinnati for the year 1909, the milk question is dwelt on quite fully in the report of the chemist and bacteriologist. The greater part of the latter report is devoted to chemical examinations of milk, but the following in regard to the bacteriological tests is quoted in full:

"During the last two years the department has been making bacteriological counts of market milk. In 1908 there were 213 counts which showed an average count of 12,048,000 bacteria per cubic centimeter. Forty-two per cent contained less than 500,000 bacteria per cubic centimeter; 14 per cent. between 500,000 and 1,000,000 bacteria per cubic centimeter; 21 per cent. between 1,000,000 and 5,000,000 bacteria per cubic centimeter, and 23 per cent. contained over 5,000,000 bacteria per cubic centimeter. This is not a very bad condition, as 56 per cent. contained less than 1,000,000 per cubic centimeter and 77 per cent. contained less than 5,000,000 bacteria per cubic centimeter.

"In 1909 there were 194 counts made which showed an average of 4,466,000 bacteria per cubic centimeter. Forty-two per cent contained less than 500,000 per cubic centimeter; 6 per cent. between 500,000 and 1,000,000 bacteria per cubic centimeter; 26 per cent. between 1,000,000 and 5,000,000 bacteria per cubic centimeter, and 28 per cent. more than 5,000,000 bacteria per cubic centimeter. While the average count of the year is much less than last year, the per cent. of low counts is not quite as high. Forty-six per cent. contained less than 1,000,000 bacteria per cubic centimeter, and 72 per cent. less than 6,000,000 bacteria per cubic centimeter.

EDITOR'S NOTE. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

"This work was instituted to find out about what the average bacterial count of our market milk would be, and to give us some definite statistics should we wish at any future time to establish a bacteriological standard.

"The result shows that at least 75 per cent of the milk sold in Cincinnati throughout the entire twelve months of the year has a fair bacteriological content. Only about 25 per cent. of the milk examined contained an excessive bacteriological count. With the continued improvement shown, it is only a question of a short time when a bacteriological standard of 500,000 or 1,000,000 bacteria per cubic centimeter will not work a hardship upon the dairymen, and will be possible in Cincinnati as a routine measure."

It seems as if a statement like the above should not pass unnoticed, for while it shows a poor condition of the milk supply it also indicates a woeful lack of knowledge of what has been done elsewhere on the bacteriological side of the milk question or else a total disregard of that work, which would seem to be about as bad.

To make the matter worse—after saying that the milk for the entire twelve months of the year has a fair bacteriological content—on the following page is a table showing the examinations by months and this shows that during the four months May to August, inclusive, but 33 examinations were made, namely, 6 in May, 15 in June, not a single examination in July and only 12 in August. In other words the great majority of the counts were made during those months when they would naturally be the lowest.

While it is possible that a standard of 500,000 might "work a hardship" on the dairymen how about the citizens of Cincinnati? Have they no rights?

Personals.—George T. Palmer, S. B., a graduate of the University of Rochester, and afterwards of the Department of Biology, Massachusetts Institute of Technology, has been appointed Sanitary Inspector under Dr. A. Clark Hunt, Chief of the Division of Medical and Sanitary Inspection, State Board of Health of New Jersey, with headquarters at Trenton. Mr. Palmer was at the time of his appointment Research Assistant in the Sanitary Research Laboratory and Sewage Experiment Station, Massachusetts Institute of Technology, where he has been at work for the last two years under the general direction of Professors Sedgwick, Winslow and Phelps. Mr. Palmer's principal publication was made in collaboration with Professor Winslow and is entitled "A Comparative Study of Intestinal Streptococci from the Horse, the Cow, and Man."

Mr. Carl T. Pomeroy, a graduate of Bates College and for the last year and a half a graduate student in the Biological Department of the Massachusetts Institute of Technology, has recently been appointed Assistant to the Health Officer (Mr. J. J. O'Brien) of the Board of Health of Plainfield, N. J.

Mr. T. R. Lathrope, a graduate of Lafayette College and until recently a graduate student in the Biological Department of the Massachusetts Institute of Technology, has been appointed Assistant to the Chemist (Mr. James A. Newlands) of the State Board of Health, of Connecticut, and is now connected with the Laboratory at Middletown, Conn.

Typhoid Not a Reportable Disease in Iowa. The Quarterly Bulletin* of the Iowa State Board of Health has an excellent article on "Typhoid Bacilli Carriers" by Dr. Henry Albert, State Bacteriologist, in which he speaks of the danger of carriers handling food stuffs. The article closes with the following paragraph:

"The problem of protecting the public from typhoid carriers involves so many questions that it is not readily amenable to public control. The State Board of Health does, however, regard it of such great importance that it has sought to obviate one of the principal sources of danger by the adoption of the following rule: 'That no person in the State of Iowa who is known to harbor typhoid bacilli in his body, or in other words, to be a typhoid carrier, shall be permitted to handle milk or other dairy products offered for sale.'"

Immediately following this under the heading "Typhoid Fever," we find the following sentence: "Typhoid fever is not a reportable disease, because of recent legislation, therefore the Iowa State Board of Health has no means of knowing to what extent the disease prevails in this state."

Comment is unnecessary.

Scientific Farming. A very interesting series of twelve lectures on Scientific Farming and Farm Management, the speakers being experts on their subjects, the majority being on the faculty of some Agricultural College, is being given under the auspices of the Warelands Dairy School at 3 Joy Street, Boston.

Mrs. Ware, who conceived the idea of having the series as a winter course, is the proprietor of the Warelands Dairy and the pioneer in supplying certified milk to the Boston Market. The interest shown has exceeded her most sanguine hopes.

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* Vol. XXIV, No. 2, Oct.-Dec., 1910.

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

Hygienic Aspects of Chemical Treatment for Water Purification.

The officials in charge of water supplies are often asked: "What effect do the chemicals used in water purification works produce upon the consumers?"

The question shows that many people have an entirely erroneous idea of the chemical processes which are applied in purifying water. Of the millions of people who drink water every day coming from such plants it is probable that not one per cent. realize that the chemicals added are either precipitated in settling basins or removed by filters before the water reaches the consumer.

The principle upon which chemical treatment depends is that the soluble salts added to the raw water combine with the alkaline substances already present to form insoluble precipitates. These gelatinous, flocculent, or crystalline compounds absorb the bacteria, particles of clay, etc., mechanically, and, being heavier than water, sink to the bottom of the sedimentation reservoir.

The people understand that tons of chemicals are added daily, and not understanding that the salts become insoluble, imagine that all of the chemicals pass into the water pipes. Not only is this popular idea incorrect, but in water softening plants the reagents added also remove some of the compounds which were carried by the raw water originally.

Let us take as an example the reaction which follows when quick-lime is added to natural waters which have been made hard by dissolving limestone in passing through the soil. Carbonates of lime exist in the water combined with an extra molecule of carbonic acid gas ($CaCO_3.CO_2$). As quick-lime has a strong affinity for CO_2 it absorbs the extra molecule of CO_2 forming carbonate of lime—an insoluble compound.

Thus $CaCO_3.CO_2+CaO=2\ CaCO_3$

That is to say, when quick lime is added to a hard water both the lime added and an equal amount of the lime dissolved in the raw water are removed.

DATA FROM WATER PURIFICATION WORKS—January, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins. Settling Basin: Period in Hours	Settling Basin: Effluent: Turbidity	Settling Basin: Effluent: Bacteria per c. c.	Coagulation Basin: Period in Hours	Coagulation Basin: Effluent: Turbidity	Coagulation Basin: Effluent: Bacteria per c. c.	Parts per 1,000,000. Unpurified Water: Turbidity	Unpurified Water: Color	Unpurified Water: Total Hardness	Purified Water: Turbidity	Purified Water: Color	Purified Water: Total Hardness	Nos. of Bacteria per Cu. Centimeter: Unpurified Water	Nos. of Bacteria per Cu. Centimeter: Purified Water	No. of Deaths from: All Causes	No. of Deaths from: Typhoid Fever	No. of Deaths from: Pulmonary Consumption
Albany, N. Y.	107,000	Hudson River.	16 rapid sand, 8 slow sand Filters	24.1	1.6	16.	17	30,000	....	....	....	25	31	79	0	25	79	34,500	23	208	4	29
Cincinnati, O	364,463	Ohio River	Rapid sand filters using iron and lime as a coagulant.	14.4	3.0	48	85	12,000	10	17	3,400	240	..	60	0	...	78	63,000	11	.	..	
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	14.8	0.17	18.	7	43	Combined with the sedimentation.			137	35	199	0	9	89	36,000	6	233	4	32
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	8.3	2.5	6	...	....	1.5	....	70	49	6	31	0	0	31	19,700	3	103	4	44
McKeesport, Pa.	42,694	Yoghiogheny R.	Water softening and mechanical filtration.	3 6	0 1	20.	0	139	Combined with the sedimentation.			185	...	101	0	0	70	2,300	37	44	0	3
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using iron and lime as a coagulant.	14 7	1.15	4.	350	2,800	24	35	180	375	14	102	0	4	63	3,300	180	557	6	64
Toledo, O.	168,000	Maumee River	Mechanical filtration.	15 2	1 72	7.5	10	640	Combined with the sedimentation.			380	30	...	0	8	.	44,200	68	246	3	.
Washington, D.C.	348,460	Potomac River	Sedimentation and slow sand filters.	60 7	0 28	24	43	22,850	72	15	7,300	94	0	82	0	0	82	25,800	135	585	6	59
Youngstown, O.	80,000	Mahoning River	Sedimentation and mechanical filtration.	8.3	4 0	3.5	20	3.500	Combined with the sedimentation.			65	23	51	0	1	65	30,100	181	104	4	6

REMARKS: The 16 rapid filters at Albany ran at a rate of 90 million gallons per acre; the 8 slow sand filters run at a rate of 6 million gallons per acre.
Alum is used at Washington, D. C., only during times when the turbidity of the applied water is in excess of 50 p. p. m.; during January it was used about 44% of the time.
The high bacterial average at New Orleans in the Filtered Water in January was due to high counts caused by Algae growths.

W. R. COPELAND, Reviewer.

Another common example illustrates the reaction which takes place hen coagulants are applied to clarify a water. Sulphate of alumina, ommonly called "filter alum," has a formula $Al_2\ (SO_4)_3$ and the reaction ıns $Al_2(SO_4)_3+3\ CaCO_3=Al_2(CO_3)_3+3\ CaSO_4$.

The $Al_2(CO_3)_3$ then unites with water forming the insoluble hydrate ıd carbonic acid

$Al_2(CO_3)_3+3H_2O=Al_2O_6H_6+3CO_2$.

Here again the chemical added to the water is precipitated, but in this ıse the flocculent aluminum hydrate mechanically entangles the mud, ıd most of the bacteria and other matters in suspension, leaving the ater clear.

From the reactions written above, it will be seen that the aluminum recipitates and therefore the water in the mains contains no alum. A milar reaction takes place when "lime and sulphate of iron" are used ; coagulants.

Thus $Fe\ SO_4+Ca\ O_2H_2=Fe\ O_2H_2+CaSO_4$

hat is to say, the soluble sulphate of iron is converted into the insoluble ydrate which settles out in the coagulating basins.

Such salts as carbonates and sulphates of lime, magnesia, soda, iron c., are apparently not injurious to the human system in small amounts. s a matter of fact these chemicals form part of our daily food and are ven freely as medicines. Iron, for instance, is given as a tonic, and lime lts are found in every one of the fancy table waters which people pay gh prices for, or for which they go to Saratoga, Virginia Hot Springs, or her similar resorts.

When prescribed by physicians as a purgative, sodium sulphate is given ten to fifteen grain doses three times a day, while the effluent from puri- cation works contain only about ten to twelve grains in a gallon. This ould mean a person would have to drink several gallons of such water ery day to get a medicinal dose of sodium sulphate. As there are very w people who drink a gallon of water in twenty-four hours, and as most the chemicals added in water purification are removed before they ach the consumer, it is evident that when chemicals are added in a proper anner to purify the water they do not exert any deleterious effect upon ıe consumer.

The effect of the chemical treatment of waters in the reduction of phoid fevers and other intestinal diseases is too well known to need omment. The following statistics taken from the annual report of the ity of Cincinnati for 1910 are, however, well worth quoting.

Cincinnati, Ohio, Typhoid Fever Statistics, 1905 to 1910.

Year	Typhoid Fever		Rate per 1,000 of population	
	Cases	Deaths	Cases	Deaths
*1905	746	155	217	45
*1906	1,940	239	561	69
*1907	1,252	157	360	45
‡1908	235	67	67	19
‡1909	218	45	62	13
‡1910	183	21	50	5.7

* Note—City Water Unfiltered. ‡ Note—City Water Filtered.

The data given in this table shows that when the water was purified by coagulation and filtration the typhoid fever rate was cut down by a large per cent. This has been the universal experience in water purification.

ANNOUNCEMENTS AND COMMUNICATIONS.

Havana Meeting of the American Public Health Association. The Local Committee of Arrangements for the Havana Meeting has been organized as follows:

President, Dr. Varona Suarez, Secretary of Sanitation; Vice-President, Dr. J. Guiteras, Director of Public Health; Secretary, Dr. Frederico Torralbas, Chief Sanitary Inspector.

All correspondence intended for the local committee should be addressed to the Secretary, Dr. Torralbas.

The local committee has appointed various sub-committees on receptions, hotels, transportation rates, arrangements of sessions, etc. A conference with one of the Steamship Companies has already been held relative to a reduction of rates.

If the members of the Association are interested it is possible that a visit can be arranged to Santa Domingo.

Back Numbers of A. P. H. A. Reports and Papers, etc., at Reduced Prices. The Committee of Seven has adopted the following resolutions:

"That all volumes of papers and reports, in excess of fifty of any one edition, be sold at a flat rate of one dollar per volume, with a discount of ten per cent. to the trade, the purchaser to pay transportation charges, and that the Committee on Journal be requested to further the sale of these volumes through the pages of the Journal."

"That volumes of 'Disinfectants and Disinfection,' and of other essays printed by the Association, in excess of fifty of each kind, be sold at a flat rate of twenty per cent. of the original fixed price, with the same discount and under the same conditions as are specified in the preceding resolution with respect to the sale of reports and papers."

In accordance with the above a revised schedule of prices on all former publications of the Association will be advertised in the April number of this JOURNAL.

BOOK REVIEWS.

Practical Dietetics with Reference to Diet in Disease. By Alida Frances Pattee. Sixth Edition. Published by the Author. Mount Vernon, New York, 1910. Price, $1.50.

The Fifth Edition of this book has previously received favorable notice here. As revised it deserves yet warmer commendation. Its pages contain material singularly well chosen to indicate the practical application of the soundest science. The introductory section on the physiology of nutrition is clear and modern. In the discussion of diet in various conditions extended knowledge and sterling good sense are equally displayed. Helpful estimates of calorific values accompany the numerous recipes. This should be a most valuable manual not only in training schools but in the hands of intelligent home-keepers.

P. G. Stiles.

A Study of the Normal Constituents of the Potable Water of the San Francisco Peninsula. By John Pierce Mitchell, Assistant Professor of Chemistry, Leland Stanford Junior University. Leland Stanford Junior University Publications, Series No. 3.

The object of this work has been to determine from a sanitary point of view the normal constituents of the potable water supplies of the San Francisco Peninsula, with the view of aiding in the future interpretation of analyses when by reason of increased population the purity of any water supply may be in question. The author has given in detail the methods of analysis used, and has entered into explanations as to the deductions which may be drawn from the individual chemical determinations.

Aside from the general interest which every sanitary chemist takes in a work of this character, the experimental work undertaken to determine which of the various common methods of nitrate determination, in the presence of a high chlorine content, gives the most accurate results, is worthy of mention. Conclusions are as follows: "For waters containing large amounts of chlorides the nitrogen present as nitrate may best be determined by the reduction method using the copper-zinc couple and oxalic acid. If the result of the determination indicates a nitrogen content in excess of five parts per million the determination should be repeated, using the phenol-sulphonic acid method and standards prepared according to Mason's* suggestion.

Appended is a map giving "isochlors" for the region examined. As would be expected the variation in rainfall and the exposure to sea winds are shown to be factors of great importance as regards the chlorine content. Every known precaution as been observed to insure the accuracy of this investigation and the work as a whole is bound to become of great value to future sanitarians in the locality.

A. J. Slack.

* Chemical Examination of Water, 3rd Ed., pp. 50–51, Jour. Am. Chem. Soc. 16:72 (1894).

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SPECIAL ARTICLE

A FURTHER CONTRIBUTION TO OUR KNOWLEDGE OF INSECTICIDES.

Fumigants.

By CHAS. T. McCLINTOCK, H. C. HAMILTON and F. B. LOWE,
From the Biological Laboratory, Parke, Davis & Co., Detroit, Mich.

In a paper* read before the International Congress of Zoölogists at Boston in 1907, certain facts were presented relative to the comparative germicidal, insecticidal and toxic values of a number of substances which are well known for one or another of these properties. (See Table of Coefficients, page 228.) The various methods of testing were noted but particular attention was given to the method of insecticidal valuation of those substances which are applied by contact in liquid form or in solution.

The present paper contains the results of experiments with substances used as fumigants or by contact in vapor form and is in a sense a continuation of the previous work.

The fumigation method of applying insecticides is one which appeals to any one who has had occasion to combat insects in houses or premises

* A Contribution to Our Knowledge of Insecticides. Chas. T. McClintock, E. M. Houghton, H. C. Hamilton.

where the vapors or gases can be confined a sufficient length of time to become effective. Such methods are now in common use for the treatment of stored grain for weevil, of nursery stock and the more valuable orchard trees for scale and white flies, and for driving out or destroying flies and mosquitoes.

The heat treatment for stored grain and flour now being successfully used is a convenient modification of the fumigation process.

TABLE OF COEFFICIENTS.

	Toxicity.	Germicidal	Insecticidal
Arsenic	40.	.7	50.
Alcohol	.09	.025	.05
Carbolic Acid Aq. Sol	1.	1.	1.
Carbolic Acid Soap	.5	.75	2.
Coal Tar Disinfectant	.27	5.	4.
Coal Tar Insecticide	.2	.5	125.
Cresylic Acid and Soap	.4	2.	2.5
Morphine Sulphate	1.33	.5	2.—
Nicotine	53.	1.	15.+ —
Potassium Cyanide	83.	.5—	5.
Mercuric Chloride C. P.	20.	300	.5— +
Mercuric Iodide (discs.)	20.	1000.	.5+
Linseed Oil Soap	.16	.5—	5.
Formaldehyde	....	16.	4.
Sulphuric Acid	....	5.	15.+ —
Turpentine Soap	....	1	40.

The table herewith quoted is from our paper mentioned on the previous page. It is a summary of the work, a reprint of which will be supplied on application to Parke, Davis & Co., Detroit, Mich.

There is as yet no extensive use of the fumigation method for insect eradication. The reason for this may be partly due to lack of exact information as to substances applicable and how to use them. So far there has been no comprehensive classification of the substances which may be used in combating insects, nor of the various methods which make each of value.

A convenient classification is one based on the way they can be used to best advantage. By such a system the substances group themselves into four classes as follows:

I. Those used by contact in liquid form or in solution.

II. Those used by contact in dry or powdered form.

III. Those used by contact in vapor form.

IV. Those used by mixing with food or the ingestion group.

The value of this form of classification is in no way impaired by the fact that some substances will be included in more than one of the classes. Every substance which can be made use of by a certain method of application should appear in that class. Insect powder, or specifically the powdered half-opened blossoms of Chrysanthemii cinerariifolium, may be used as such, may be used by burning, or may be extracted by some sol-

vent and made use of in solution. It should therefore appear in each of these classes.

The third class, or those which are applied in gaseous or vapor form, includes such substances as occur in that form or from which a gas or vapor may be generated. This may be produced by evaporation at room temperature for very volatile substances, or at an elevated temperature for those less volatile, or may be generated by bringing about a chemical reaction.

Although the U. S. Government has published details of methods for destroying scale and for combating household insects with Hydrocyanic Acid Gas, reference to the literature for information on the action of fumigants disclosed little of practical value. Trillat and Lagandre,* in an article entitled "Etude sur la Toxicite des Vapeurs de quelques Substances Chimiques sur les Moustiques," which appeared during the course of our work, described some experiments with several substances used as fumigants three of which, Nicotine, Pyridine, and Quinolin gave quite remarkable results. These high values were only partially confirmed by our experiments.

In this series of experiments we have attempted to test substances which have been used as insecticides for their values under certain conditions making for high efficiency, and also under such conditions as would obtain in the practical application of the process. A bell jar was used for the former, while for the latter a ventilation hood such as are common in chemical laboratories was adapted to the purpose, supplemented by room and house experiments as practical tests.

In the hood experiments recorded in Table I a sliding window and a hand hole closed by a plug provided the necessary openings for placing apparatus, materials and insects, while a slide operated from without served admirably to open and close the suction draft and thus secure ventilation. The hood was also provided with steam, gas and electric stove for generating the vapors, and these were so arranged as to control the heating without disturbing the experiment. These different methods of heating were necessary because of the varied characters of the substances used, among which were the highly inflammable and very volatile substance Carbon Disulphide, and Creosote Oil, its antithisis, which requires a temperature of 300° C. for quick and complete volatilization. The vessels in which the substances were placed for generating vapors or gases required some changing to suit the substance, but in general the rule was followed to give the greatest surface and least depth possible and heat so applied that volatilization could proceed rapidly and completely.

* Hygiene Generale et Applique'. Vol. IV. No. 9. p. 542.

The charts shown in Fig. I are reproductions of the sheets used for recording experiments. It will be noted that these four are sufficient to determine the final value of sulphur for each of the five insects used in Table I, since the quantity used in each experiment was just sufficient to kill one or more, and in most cases insufficient to kill others of the species used.

Other than these shown in the illustration no attempt is made to give details of experiments where the amount of the substance used was insufficient to kill the insects. It is needless to say that four experiments were not sufficient to determine the coefficients for each of the insects. It is necessary to determine in almost every case the length of time required for volatilization, the rate at which this should best be carried on, the length of time during which the insects should be exposed to the vapors, to say nothing of the great number of experiments necessary to determine the minimum quantity which would kill the insects in question.

Throughout this series of experiments the primary object has been to make them of the greatest practical value. Therefore the insects used were those species which may be considered as common household pests, the eradication of which is desired by everyone. The list of those used in the hood experiments includes the bed-bug, cockroach, moth, fly and mosquito.

The bell jar experiments, although not of practical value, serve to indicate the efficiencies of substances under ideal conditions. For this reason no attempt was made to determine their value except for the most resistant insect, namely the bed bug.

One of the difficulties experienced in using the bell jar was that when any substance required heating and especially if it must be burned to generate the active vapors, the escape of these vapors was inevitable. To overcome this it was decided to withdraw the air from the jar and then restore equilibrium after vaporization had been accomplished. This introduced another difficulty as combustion required oxygen. Finally the plan was followed which is best understood by a glance at the illustration. (See Fig. II.)

Through one of the stop cocks at the top of the jar in illustration II the suction pump produced a partial vacuum. Through the other the degree of pressure was recorded on the gauge which is shown to the left of the jar. Through the lower stop cock the vapors were drawn into the jar. The substance to be vaporized was placed in the flat, brass dish, heated from below by gas, steam, hot air, or any convenient method, the vapors being collected in the funnel. When vapor-

Fig. I.

INSECTICIDE EXPERIMENTS.

FUMIGANTS.

SUBSTANCE Sulphur DILUTION 300,000
QUANTITY 2.6 gms VAPORIZED BY burning
TIME 2.00 TO 2.04 TO 3.04 HOURS 1
DATE 11/1-1910 OBSERVED BY H + L

No.	INSECTS	NOTES	RESULTS
4	BEDBUG	not stupefied	not killed
10	COCKROACH	not stupefied	not killed
20	HOUSE FLY	not stupefied	not killed
10	CLOTHES MOTH		dead
50	MOSQUITO	not stupefied	not killed

INSECTICIDE EXPERIMENTS.

FUMIGANTS.

SUBSTANCE Sulphur DILUTION 250,000
QUANTITY 3.2 gms VAPORIZED BY burning
TIME 11.00 TO 11.04 TO 12.04 HOURS 1
DATE 11/1-1910 OBSERVED BY H + L

No.	INSECTS	NOTES	RESULTS
4	BEDBUG	not stupefied	not killed
10	COCKROACH	not stupefied	not killed
20	HOUSE FLY		dead
4	CLOTHES MOTH		dead
50	MOSQUITO		dead

INSECTICIDE EXPERIMENTS.

FUMIGANTS.

SUBSTANCE Sulphur DILUTION 200.000
QUANTITY 4 gm VAPORIZED BY burning
TIME 10.00 TO 10.04 TO 11.04 HOURS 1
DATE 11/1-1910 OBSERVED BY H + L

No	INSECTS	NOTES	RESULTS
3	BEDBUG	not stupefied	not killed
20	COCKROACH		dead
20	HOUSE FLY		dead
4	CLOTHES MOTH		dead
50	MOSQUITO		dead

INSECTICIDE EXPERIMENTS.

FUMIGANTS.

SUBSTANCE Sulphur DILUTION 100,000
QUANTITY 8 gm VAPORIZED BY burning
TIME 8:00 TO 8:04 TO 9:04 HOURS 1
DATE 11/1-1910 OBSERVED BY H + L

No	INSECTS	NOTES	RESULTS
4	BEDBUG		dead
10	COCKROACH		dead
10	HOUSE FLY		dead
3	CLOTHES MOTH		dead
60	MOSQUITO		dead

Fig. II.

ization commenced the cock was opened sufficient to create a draft, with the result that no loss of vapors occurred at any time, the preliminary exhaustion of the air from the jar causing a better contact with its base than is possible otherwise.

This method made possible the measuring of definite proportions of gases which could be drawn from a container, such as illuminating gas, sulphur dioxide, carbon dioxide and hydrogen sulphide. These gases were introduced into the jar when the gauge indicated 680 mm. mercury and when the vacuum had dropped to one half or any desired quantity, the remaining partial vacuum was made up with air. In this way the effective dilution of the gas or vapor was readily determined.

The results in Table II are those obtained by exposing the insects for one hour to the vapors of the different substances except as noted in two cases. Nicotine and Pyridine are two substanes which require a longer exposure to the vapors to bring out a high efficiency. For that reason values are given both for one hour and for three hours exposure. The former, however, more nearly coincide with the results to be expected in practice.

The "quantity" column shows both the amount which, when vaporized in the 15550 Cc. bell jar, was efficient and the next smaller amount which was insufficient to kill the insects. The coefficient column shows the relative efficiency of the substance compared to the efficiency of sulphur dioxide vaporized in the hood. This was done not only for convenience in having only one standard, but to compare the values of the substances vaporized under different conditions. One fact that should be noted regarding the method made use of in obtaining these results is that bed bugs are not killed by being kept in an exhausted container for four hours. When insects are placed in a bell jar and the air removed, they quickly become dormant as though dead, but even after four or five hours so exposed, they recover and appear as healthy as ever.

The list of substances used was made up largely from those drugs or chemicals which are considered to have value as insecticides. It is not exhaustive, but is intended merely to clear up the mass of contradictory evidence regarding these values. As in the work with contact insecticides one of these substances was selected as a standard for comparison. On account of the high esteem in which burning sulphur is held as a general fumigant, this substance was selected as a standard. Sulphur can be obtained in practically a pure state, it remains unchanged under ordinary conditions and with proper manipulations it can be completely burned to sulphur dioxide, the most active form in which this substance occurs.

The most convenient method for indicating the value of a substance is to determine that dilution of its vapors which will kill the insects in question, that is, to obtain the ratio between the efficient weight or volume of the substance and the space in which its vapors were confined. The unit of space selected was 100,000 Cc. because of its easy transposition into the commonly used measurement of cubic feet; 1 to 100,000 is the same ratio as 1 oz. to 100 cubic feet. Therefore in the scale of values the *unit is that quantity of sulphur which will kill the bed bug when burned in an enclosed space of 100,000 Cc.* and *the efficiency of any substance may be expressed by a number which is its Sulphur Dioxide Coefficient.* Thus if 8 gm. or 8 Cc. of any substance were required to kill the bed bug in the 800,000 Cc. chamber, the efficient dilution of that substance is 1 to 100,000 and its coefficient is 1.

The actual quantity necessary to destroy members of any particular species of insect must, in most instances, be worked out for that species because of the disparity in the resistance of the different species toward any fumigant. And although the Sulphur Dioxide Coefficients of many substances are found to vary in much the same way for the different species, the amount of variation cannot be known except by actual experiment.

Table I is a list of the substances tested and the species of insects used in the hood experiments, together with the quantity of each substance which, when properly transformed into vapors, was sufficient to kill the species indicated. The coefficient column shows the inverse ratio between this quantity and 8 grams, the weight of sulphur which, when burned, kills the bed bug in the 800,000 Cc. of enclosed space.

The efficient dilution of the vapors of any substance may be obtained from this coefficient by multiplying by 100,000.

For example, if one wishes to use carbon disulphide, by consulting No. 28 in the Table I it is shown that 24 grams were required to kill bed bugs where only 8 grams were required of Sulphur. It is therefore only 1-3 as strong and its coefficient is 0,3+. Its efficient dilution is 33,000.

Sulphur when quickly and completely burned is a most effective insecticide. It is objectionable as a general fumigant because of the poisonous and suffocating vapors of the sulphur dioxide gas, its chemical action on metals and coloring fabrics and the difficulty experienced in effecting its complete combustion. To be efficient it must burn rapidly and completely. Under proper conditions it burns readily, is not quickly dissipated and has a prompt effect on the insects. This effect is not merely stupefactive as no insect once overcome ever recovers.

INSECTICIDE EXPERIMENTS.

TABLE I—Hood.

Time of exposure—Varied as conditions required.
Column 1—Quantity used to kill the specified insect.
Column 2—Coefficient of efficiency compared with the efficiency of Sulphur Dioxide on bed bugs.

Substance	Bedbug		Cockroach		Housefly		Clothes Moth		Mosquito	
	1	2	1	2	1	2	1	2	1	2
1 Sulphur Dioxide as Sulphur	8	1	4	2	3.2	2.5	2.6	3	3.2	2.5
2 Pyridine	8	1	4	2	2	4	1.6	5	1.6	5
3 Pyridine Bases (Merck)	5	1.6	4	2	1.6	5	1.6	5	.....	.....
4 Quinoline	8	1	8	1	.....	.....	2	4	.....	.....
5 Creosote Oil	4+	2	4+	2	2	4	1	8	8	10
6 Carbolic Acid	8	1	8	1	8	1	8	1	4	2
7 Napthalene	8+	1	8	1	2	4	4	2	1	8
8 Kerosene	16+	0.5	16+	0.5	4+	2	4	2	4+	2
9 Anilin Oil	6.3+	1.3	6.3+	1.3	6.3	1.3	6.3	1.3	4	2
10 Cedar Oil	11.5+	0.7	11.5	0.7	8	1	2	4	1	8
11 Citronella Oil	4+	2	4+	2	2	4	4	2	1	8
12 Cloves Oil	4+	2	4+	2	2	4	2	4	1	8
13 Peppermint Oil	4+	2	4+	2	4	2	4+	2	2	4
14 Pennyroyal Oil	8+	1	8+	1	4	2	4	2	1	8
15 Australene	8+	1	8+	1	3.2	2.5	8	1	2	4
16 Turpentine (Oregon Fir)	36+	0.2	36+	0.2	36+	0.2	16+	0.5	8	1
17 Oil Pinus Palustris	16+	0.5	16+	0.5	4	2	4	2	2	4
18 Oil Turpentine	20+	0.4	20+	0.4	20	0.4	20	0.4	10	0.8
19 Turpentine (Mich. Wood)	16+	0.5	24+	0.3	16	0.5	16	0.5	.....	.....
20 Benzaldehyde	4+	2	4+	2	2	4	2	4	1	8
21 Nitrobenzol	8+	1	8	1	1.6	5	1.6	5	1	8
22 Ammonia 28%	36+	0.2	36+	0.2	20+	0.4	36+	0.2	20	0.4
23 Alcohol, Ethyl	80+	0.1	80+	0.1	80+	0.1	80+	0.1	80	0.1
24 Alcohol, Methyl	80+	0.1	80+	0.1	80+	0.1	80+	0.1	80+	0.1
25 Acetone	40+	0.2	40+	0.2	40+	0.2	40+	0.2	14+	0.2
26 Chloroform	40+	0.2	40+	0.2	16+	0.5	16+	0.5	16+	0.5
27 Ether (Ethyl Oxide)	......	......	......	.....	15+	0.5	.....	.....	.....	.....
28 Carbon Disulphide	24	0.3	36	0.2	4	2	2	4	4	20
29 Carbon Tetrachloride	40	0.2	40+	0.2	40+	0.2	40+	0.2	40	0.2
30 Chloretone	4+	2	4+	2	4	2	4	2	1	8
31 Camphor	8+	1	8	1	4	2	4	2	2	4
32*Nicotine, 80% Sol.	25	4	25	4	6	20	25	40	1	100
33 Hydrocyanic Acid, as Potassium Cyanide	6.3	1.3	6.3	1.3	2	4	1	8	2	40
34 Paraform	8+	1	8+	1	4	2	8	1	1	8
35‡Formaldehyde 40% Sol.	54+	0.1	54+	0.1	16+	0.5	16+	0.5	8+	1
36 Stramonium Leaves	10	0.8	10	0.8	10+	0.8	10+	0.8	4	2
37 Sabadilla Seeds	8+	......	8+	.....	16	0.5	16+	0.5	4	2
38 Chrysanthemum Flowers	80+	0.1	80+	0.1	2.6	3	4	2	1	8

The + sign after a number indicates that this quantity was the largest used and that it was insufficient.

* Coefficient of Nicotine based on 100% Alkaloid.

‡ Quantity of Formaldehyde to be an efficient germicide is 13½ Cc. or a Coefficient of 0.625.

INSECTICIDE EXPERIMENTS.

TABLE II—Bell Jar. Capacity 15550 Cc.

Insect used—Bed Bug.
Time of exposure—1 hour, except as noted.

Substance	Quantity	Coefficient	Time	Result
1. Sulphur	0.052	3	....	dead
	0.039	4	....	recov.
2. Formaldehyde Sol. 40%	0.31	0.5	....	dead
	0.26	0.6	....	alive
3. Creosote Oil	0.052	3	....	dead
	0.039	4	....	alive
4. Cresylic Acid	0.052	3	....	dead
	0.039	4	....	alive
5. Carbon Disulphide	0.077	2	....	dead
	0.052	3	....	recov.
6. Chloroform	1.6	0.1	....	dead
	1.04	0.15	....	recov.
7. Carbon Tetrachloride$_4$	1.6	0.1	....	dead
	1.04	0.15	....	recov.
8. Australene	1.15	1.0	....	dead
	0.10	1.5	....	alive
9. Benzaldehyde	0.15	1.0	....	dead
	0.10	1.5	....	alive
10. Nitrobenzol	0.21	0.75	....	dead
	0.15	1	....	partial recov.
11. Chrysanthemum Flo. Fl. Ex.	2.0	0.08	....	alive
12. Illuminating Gas	33.33%	....	....	alive
	50.00%	....	....	dead
13. Eucalyptol	0.031	5	....	dead
	0.026	6	....	alive
14. Menthol	0.2	0.8	....	dead
	0.15	1	....	alive
15. Pyridine	0.031	5	1 hr.	dead
	0.015	10	3 hr.	
16. Nicotine	0.021	0.75	1 hr.	dead
	0.210	7.5	3 hr.	

Pyridine is much more effective when it volatilizes slowly. Spontaneous evaporation is the best method, the room to be closed for 15 hours or more; at the end of that time the odor will usually be dissipated. It is worth noting that the value of Pyridine is enormously enhanced when evaporated in a practically air tight container. In some bell jar experiments a coefficient of 30 was obtained. It should also be noted that it has value only as a fumigant since a solution for contact work is almost useless.

Pyridine bases, the mixed bases separated from Creosote Oil, is not materially better as an insecticide than pure Pyridine. It must be gently heated to generate vapors in sufficient quantity to be effective against insects, and a long exposure is necessary.

Quinolin, one of these pyridine bases easily obtained, has practically the same value as pyridine with the disadvantage of having a more repulsive odor. Like pyridine it has a remarkable high value when volatilized in an airtight chamber. This high efficiency is, however, not obtainable in practice.

Creosote Oil has as high a value as pyridine, and in some cases higher. It has the disadvantage, however, of leaving an oily deposit which becomes objectionable when used in a proportion greater than 1–200,000 and cannot therefore be used for eradicating bed bugs. The objection to the use of any substance which leaves an oily deposit is that in most cases varnish is softened, thus greatly limiting its usefulness. Its persistent odor in clothing also is an objectionable feature.

Carbolic Acid is efficient in quantities which do not leave a deposit, but is much less valuable than the Creosote Oil from which it is derived. It is exceptional in that the coefficient of efficiency is the same for four different species of insects.

Naphthalene is in no essential respect different from Creosote Oil, except that it leaves less deposit and is slightly less effective.

The value of Kerosene is limited because of its leaving an oily deposit when volatilized in any quantity, and also because of its inflammable nature.

The essential oils and turpentine oils are in general of limited value. They have an agreeable odor, but the question of cost limits their use to mixtures where the odor is an advantage.

Aniline Oil is of value for mosquitoes, but its tendency to deposit oil prevents its use in larger quantities. The same may be said of benzaldehyde and nitrobenzol, neither having sufficient efficiency against bed bugs or cockroaches.

The group comprising ammonia and the two alcohols, acetone, chloroform and ether may be stated as without efficiency. Camphor and chloretone, similar substances, were found of considerable value for mosquitoes, but for other insects of not much value.

Where it is possible to use nicotine in the form of the pure alkaloid, very good results can be obtained, the fumes being extremely efficient and not objectionable if the rooms are properly aired. No other preparations yet tested show as high efficiency as this alkaloid under ordinary conditions.

Hydrocyanic Acid was somewhat disappointing, except when used on the clothes moth and mosquito. For bed bugs, cockroaches, flies, the quantity is very considerable and taken in connection with its extreme toxicity it seems advisable not to recommend it for general fumigating purposes.

In view of the results obtained by the use of gaseous formaldehyde it seems absurd to recommend it as an insecticide, since quantities much more than efficient for germicidal action are practically without effect on any of the insects. Although some of the clothes moths were found dead in this dilution not a sufficient number were ever killed to give it any value. Paraform, polymerized formaldehyde, is much more efficient than its concentration would indicate. No reason has yet been deduced for this somewhat peculiar fact.

A remarkable thing about insect powder is that while very efficient against the house fly, moth and mosquito, it was absolutely inert when used as a fumigant against the bed bug and the cockroach. This is one substance which allows application in a variety of ways. It seems equally efficient for certain insects in powder form, in solution as an extract, and as a vapor driven off by heating.

In order to compile from the data obtained in these experiments a list having any working value, it is necessary to apply a process of elimination. For instance, however effective a substance may be, if its cost is prohibitive, its use dangerous to life, or the method of its generation impracticable, that substance is consequently excluded from consideration.

Several factors were found to affect materially the values of some substances, namely, rate of generation of, and time of exposure to the vapors, also, in some cases, the location of the test insects in regard to the generating vessel. In general it may be stated that the more rapidly the full charge of gas or vapor is produced and permeates the air space, the more efficient the substance is. However, the vapors of some of the more slowly acting substances are, if rapidly produced, completely dissipated before they have had sufficient time to become effective. So, in such a case a slower evaporation or generation is necessary to allow a longer exposure to the vapor. This appears to be particularly true, of pyridine and the other coal tar bases, since a charge rapidly volatilized in the hood failed, while the same quantity allowed to evaporate at room temperature was effective.

The further fact that these substances had such high coefficients when volatilized in the air tight bell jar points to the same conclusion. The vapors were effective when much more greatly diluted, probably because they were retained for a longer time. The time of exposure is noted in the detailed experiments and deductions drawn as to the necessity for long exposure where the time factor is important.

Insects frequently appear to be dead from the action of certain vapors after only a short exposure. If removed and placed in fresh air they will

completely recover, while if they were allowed to remain in the fumigation chamber for several hours they would not recover.

The location of the insects with regard to the generating vessel is not so important as might be supposed, since in most instances vapors and gases, regardless of their specific gravity, completely permeate the air space which is enclosed. If the space to be fumigated is not tightly closed, however, those gases lighter than air will escape upwards and those heavier than air downwards, and thus insects may be so located as to escape contact with them.

It should be noted in this connection that the result of a fumigation with any substance may not coincide with the results obtained in the experiments here recorded. Several conditions affect the results of fumigation experiments very materially. A high wind, low barometer, low temperature, loosely constructed buildings, all tend toward decreased efficiency. On the other hand the average house will retain the vapors longer than the ventilation hood used in these experiments, since it was purposely left far from air tight. In fact our room experiments have shown that the coefficients of value obtained from the hood experiments are low. In other words, less of the substance than that indicated by the coefficient will be necessary to accomplish the destruction of insects, because houses built for comfort in this climate will retain the fumes for a longer period.

For a practical use of any of the substances to which a coefficient has been assigned in these experiments, the necessary quantity may be easily computed. Thus, the capacity of the premises, expressed in cubic feet, divided by 100 times the coefficient, is the number of ounces of the substances necessary to kill that particular species for which the fumigation is intended.

$$\frac{\text{Capacity in Cubic Feet}}{100 \text{ x Coefficient}} \text{ equals ounces to be used in any room.}$$

In every case the liquids are measured and the solids weighed.

SUMMARY.

1. The fumigation method for eradicating household insects is practicable.

2. These different species of insects, the bed bug, cockroach, clothes-moth, fly and mosquito, vary greatly in their resistance to fumigants.

3. The value of substances used as fumigants depends on a proper choice both of the substance and of the method used in its volatilization.

4. Many of the substances recommended as fumigants are either without value, or are greatly over rated.

5. It is possible to standardize substances which are subject to sophistication or deterioration by comparing the efficient dilution of their vapors with that of a product of known purity. This is particularly applicable to solutions of Nicotine and to Powdered Chrysanthemum Flowers.

6. As yet there is nothing from which to conclude what action the vapors have on the insects. If it were merely irritative, formaldehyde would be valuable and the vapors of burning insect powder without value. If the action were similar to anaesthesia, chloroform should have been of greater value. If the action were purely that of poisoning one would have expected the highly poisonous Hydrocyanic Acid Gas to be of exceptional value for all species of insects.

Further experiments are being carried out with those insects which infest trees and plants, animals, granaries and flour mills, the results of which will be communicated in a subsequent paper.

ORGANIZATION OF THE PENNSYLVANIA STATE DEPARTMENT OF HEALTH.*

By SAMUEL G. DIXON, M. D., LL. D.,
Commissioner of Health, Commonwealth of Pennsylvania.

Paper Read by B. FRANKLIN ROYER, M. D.,
Chief Medical Inspector, Department of Health, Commonwealth of Pennsylvania.

If you were to ask me to tell you the foundation upon which the entire structure of the State Department of Health of Pennsylvania is built, the pivot of the whole organization, the theme that runs through the work of every division, I should say it was GETTING CLOSE TO THE PEOPLE.

Clothed with ample power to enforce the broad comprehensive health laws enacted for our execution, we started with this assumption: "Our people want to be healthy if they only know how." It was our business therefore to teach them.

The public press of the state, nine hundred journals strong, responded splendidly to our call for aid. To every fireside in Pennsylvania they have carried the message of health and life. Civic clubs, labor organizations and the big employers of labor throughout the state were asked to work for the cause, and they have been constant and effective mediums through which we have reached the people. From every pulpit in Pennsylvania we have spoken through the pastor to his people and I cannot begin to tell you how much good has been accomplished through this channel. We believe in reaching the boys and girls who will soon be our men and women, and so our tuberculosis and general sanitary exhibit, as it travels through the state, makes a particular point of interesting and instructing the school children. The little people learn the lesson of health themselves and they help us wonderfully in reaching the grown-ups, and thus by the time our organization was well under way, we found that the people were coming to us, for instance, to disinfect their homes after tuberculosis.

Do you not see now what I mean by getting close to the people? Can there be any other result than a general uplift in the social and economic as well as the health conditions among those of our citizens who need help? We

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

find that such people are beginning to look upon their government as their very good friend and helper. They are learning that the State Department of Health is something more than a mere sanitary policeman; that it's sole aim is to go hand in hand with them as a guide through the darkness of ignorance and disease, out into the sunlight of right living.

Prior to the Act of June 3, 1885, the public health work in the Commonwealth of Pennsylvania was limited to measures of quarantine at the port of Philadelphia and to spasmodic measures of quarantine in the larger municipalities. The Act of 1885 provided for the appointment of a Board of Health consisting of six persons, the majority of whom were to be physicians of good standing, and a secretary who also was to be a medical man of not less than ten years professional experience.

Dr. Benjamin Lee, a member of the profession of whom we may all be proud, a gentleman who represents the highest type of medical man, was elected secretary. By virtue of his office he became the chief sanitary officer of the Commonwealth, retaining this position continuously for a term of twenty years. The Board of Health did a great deal of good in an educational way, but was so crippled in its work by lack of funds and was so circumscribed in its powers and duties that this twenty-year period may now be looked upon as an era of splendid missionary work.

The first sanitary code of Pennsylvania, adopted June 18, 1895, required the reporting to health officers of but eleven diseases. This act had been in part enforced in the larger cities but remained almost a dead letter so far as country districts and small municipalities were concerned.

The year 1905 is a memorable one in the Commonwealth of Pennsylvania from a public health standpoint, because in this year the most comprehensive and effective legislation for the protection of the health of the public ever adopted in any state of the Union was enacted by the legislature and signed by the governor of the state. This legislation consisted of three acts, a brief resume of each being necessary to a proper discussion of the present system of organization.

First: "An Act creating a Department of Health and defining its powers and duties."

Second: "An Act to preserve the purity of the waters of the state for the protection of the public health."

Third. "An Act to provide for the immediate registration of all births and deaths throughout the Commonwealth of Pennsylvania."

All three of these acts were passed by the same legislature and approved by Governor Pennypacker during the month of April, 1905.

The Act Creating the Department of Health is typical of modern legislation and centralizes authority in the hands of the Commissioner.

Provision is made for an Advisory Board, consisting of five physicians and a Civil Engineer, whom the Commissioner can call upon for the purpose of consultation and the adoption of rules and regulations. A companion act carried with it a liberal appropriation and afforded ample means for putting into force all reforms believed to be necessary to place health matters in Pennsylvania on a high plane.

The Act Providing for the Prevention of the Pollution of Public Waters delegates all authority for protecting the streams and other sources of supply to the Governor, the Attorney General and the Commissioner of Health, and completes the groundwork upon which the present organization is based.

Vital Statistics. The registration of births and deaths had been shamefully neglected up to this time. The third act, referred to by title, places this registration system in the Department of Health.

The Commissioner is ex-officio a member of the Quarantine Board of the port of Philadelphia, the Water Commission, the Medical Council and the Dental Council.

In addition to the general grant of authority the Commissioner is "to determine the most practical means for the suppression and prevention of disease."

To summarize briefly, the acts specifically provide that the Commissioner shall determine what assistants are necessary to carry out the work imposed upon the Department and places the appointing power in him. It also enables the Commissioner to purchase all supplies and materials necessary for carrying on the work of the Department; to issue subpoenas to secure the attendance of witnesses and compel them to testify; to issue warrants to any sheriff, constable or policeman; to apprehend and arrest such persons as disobey quarantine orders or regulations of the Department—these warrants must be executed forthwith and a return of the execution must be made to the Commissioner; to either personally or by his agents without fee or hindrance, enter, examine and survey all grounds, schools, apartments, buildings and places suspected of containing nuisances or questions affecting the security of life and health and to confer the authority of constable on his agents for such purposes; to order nuisances to be abated and removed and to enforce quarantine regulations; to have the general supervision of the state registration of births, marriages, deaths and communicable diseases; of practitioners of medicine and surgery, of midwives, nurses and undertakers. Any violation of the Department's orders issued by the Commissioner constitutes a misdemeanor and is punishable by fine or imprisonment or both.

Such are the powers conferred by these respective acts. Previous legislation provided for the organization of local Boards of Health in cities, boroughs and townships of the first-class. A few of the larger cities were already doing effective work. The smaller boroughs and towns were doing nothing except in times when smallpox became epidemic, when spasms of activity would be noted that were not always rational, only to die out with the end of the epidemic. All the vast rural and mountainous regions of the state were without Boards of Health, or systems of registration of any sort, and the only certificates of births and deaths in these communities were to be found on the church registers. Up to this time human beings were born, lived long lives and were buried with less likelihood of official record of their existence than was the case with high bred horses, cattle or dogs. Municipalities and private estates were permitted to discharge their sewage into the great streams of the Commonwealth without hindrance.

It is to the credit of the medical profession that the notable legislation upon which the present Department of Health in Pennsylvania bases its organization was planned by one of Pennsylvania's broad-minded active medical men. Dr. Charles B. Penrose drew the acts, presented arguments in their favor to the various legislative committees, and deserves the credit for their adoption.

ORGANIZATION.

The present organization of the Department of Health has been worked out under the power and authority conferred upon the Commissioner by the three acts just referred to. The first essential work was the organization of a Bureau of Vital Statistics, as provided by one of the three acts of 1905. A Division of Medical Inspection was organized almost simultaneously and these two departments were followed by the Division of Sanitary Engineering, the Division of Laboratories, the Division of Biological Products and the Division of Tuberculosis Sanatoria and Dispensaries. It very soon became evident that two additional divisions were required; one for purchasing, auditing and accounting, and another for the distribution of supplies required for the vast work. These various divisions rapidly grew to great size and usefulness, and today most of them have a number of important sub-divisions.

The Bureau of Vital Statistics has a registrar in charge, a full office staff and local registrars and deputies, one in each city, borough and large centre of population. These men receive all birth and death certificates in their respective communities, transmit copies of them to the Registrar of the Department and issue all burial permits previous to interment,

being compensated for their work by the respective counties. The Statistical Bureau seemed to be the natural place for developing a subdivision of Morbidity Statistics. A plan was evolved whereby upwards of 700 Health Officers should be appointed to represent the Department in the various districts in each county. Among their duties as the local representative is that of receiving morbidity reports and forwarding them to the Department of Health. Like provision has been made for the County Prothonotary to transmit to the same Bureau copies of marriage certificates filed with them by those authorized to perform the marriage ceremony. The total number of persons making reports directly to this division at the present time consist of 1170 local registrars, 670 health officers, and 67 county prothonotaries.

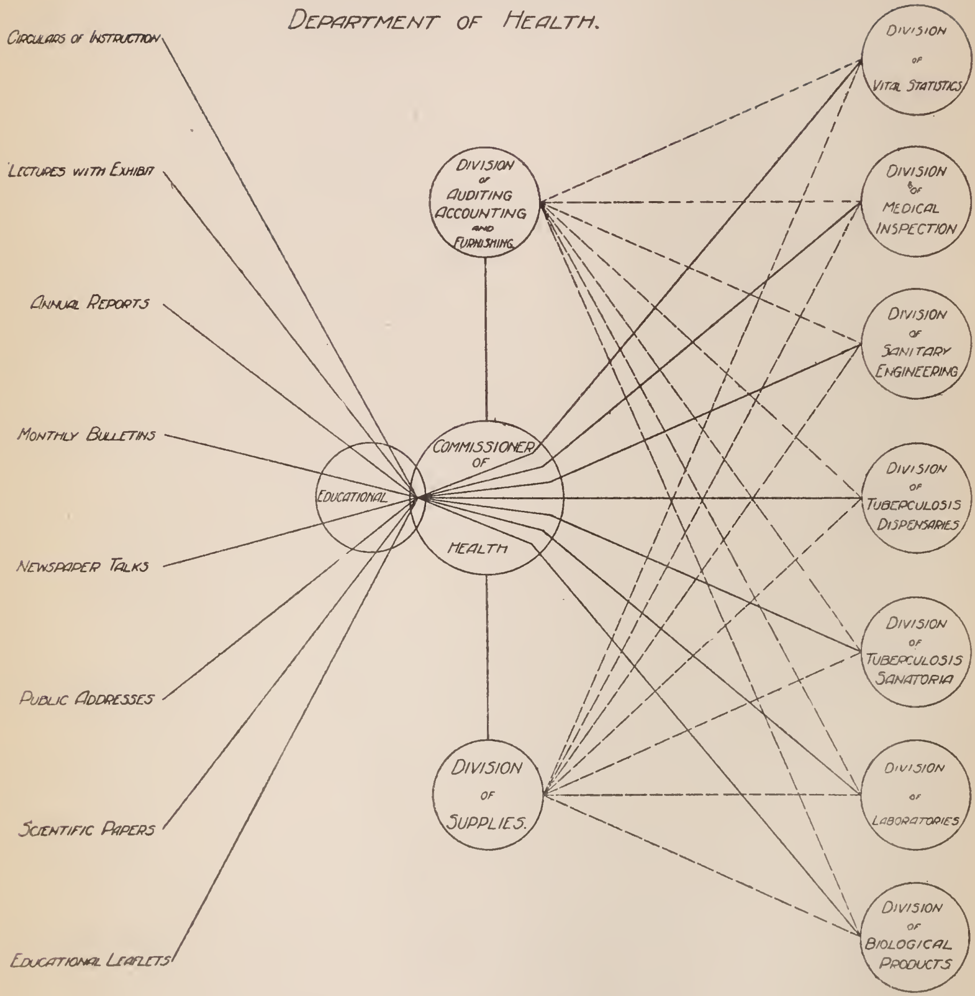
The Division of Medical Inspection as organized, consists of a Chief Medical Inspector, an Associate Chief Medical Inspector, an office staff, a Medical Inspector in each County and a number of Health Officers (the same men who report morbidity statistics). Their duties in the Medical Division consist of placarding houses on receipt of a morbidity report, establishing quarantine under the supervision of the County Medical Inspector, and disinfecting premises at the conclusion of communicable diseases.

The County Medical Inspector becomes practically the Department's consultant in his district and directs all quarantine measures through his Health Officers, is frequently called to see those sick with communicable disease, assist where necessary in establishing the diagnosis, enforces the Department's regulations for the sale of milk in premises infected with diphtheria, scarlet fever, typhoid fever, smallpox and epidemic meningitis, represents the Department in local outbreaks in communities having Boards of Health and supervises sanitary conditions of his county in general.

The Department was soon able to extend the work in the Division of Medical Inspection to a campaign of sanitary education reaching to dairy farms and to public schools. Twice each year the Health Officers visit all premises throughout the Commonwealth marketing milk and make a comprehensive report to the Department—the last inspection reaching 35,000 farms and stables producing milk. Twice each year these same Health Officers visit public schools, some 13,000 in number, and make full reports of the sanitary condition of the school room, its grounds, outbuildings and water supply. Often special inspections are made by them of insanitary conditions, nuisances, etc., in their respective districts and abatements are ordered through them, this particular part of their work being directed by the Division of Sanitary Engineering.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.



SCHEME OF ORGANIZATION

Early in the organization the Medical Examiners for the great railways of Pennsylvania, 105 in number, were appointed deputy medical inspectors to the Department of Health to serve without salary, and were clothed with sufficient power to arrest on sight persons on railway trains or in railway stations believed to be carrying infection of communicable disease.

An additional corps of medical inspectors for public schools has been appointed and work already started.

A corps of volunteer physicians rendered valuable aid to the Department in the early days of its existence by reporting menaces to health, nuisances in various communities, and by calling attention to irregularities in work undertaken by small Boards of Health.

The force in the Medical Division at the present time, in addition to the office staff, consists of 66 County Medical Inspectors, 105 Deputy Medical Inspectors (Railway Examiners), 670 Health Officers, and will include in a short time upward of 1,000 Medical Inspectors for schools.

THE DIVISION OF SANITARY ENGINEERING is one of great importance in the Department's work and is organized with seven sub-divisions, each with a staff of from eight to eighty persons, and all under the supervision of a Chief Sanitary Engineer.

The Act creating the Department places under the Commissioner's supervision all public water supplies and all public and private systems for sewage disposal. Details of every sewage disposal plant in the Commonwealth must be filed with the Department of Health and new construction can only be begun after the Commissioner, the Governor and the Attorney General have approved of the plan. After full investigations have been made by the Sanitary Engineering Division and the consent of the Governor and Auditing General has been secured, decrees are issued by the Commissioner permitting the installation of sewage disposal works or the extension of systems already constructed.

The Water Supply Commission arranges an equitable distribution of the public waters of the state and grants permission for its use. The details of all such water works must be submitted to the Commissioner of Health and his approval must be secured before construction can take place. This Division supervises the abatement of pollutions and the removal of nuisances.

One sub-division of the Sanitary Engineering Division is devoted to office work; a second, to that of map making; a third, to petty nusiances and complaints; a fourth, to sanitary field inspection; a fifth, to water works and sewage construction; a sixth, to the study of the purity of water supplies; a seventh, to effluents from disposal plants.

The total number of professional men and especially trained inspectors in this division reaches 106.

TUBERCULOSIS. In 1907 $1,000,000 was granted the Department for the purpose of organizing a campaign against tuberculosis. Two important divisions were organized for this work; a Sanatorium Division and one of Tuberculosis Dispensaries.

THE SANATORIUM DIVISION was permitted to take over a small camp already organized in the State Forestry Department at Mont Alto, in the southern part of the Commonwealth. This plant was immediately enlarged to several times its capacity and comprehensive plans were drawn for building a great sanatorium for incipient cases with provision for infirmary care for advanced cases.

THE DISPENSARY DIVISION at first consisted of a Chief of Dispensaries and a local representative—the County Medical Inspector—in 67 counties, each in charge of a dispensary. Later these dispensaries were increased to 115 in number and assistants were appointed in all the larger cities. Nurses were soon found to be an essential adjunct to this work so that today including 120 Dispensary Chiefs, we have a total of 280 medical men connected with this division and 160 nurses. Two medical men assist the Chief of Dispensaries in a supervising capacity and two nurses are devoting their entire time to supervising the nursing end of the campaign. Each large center of population in the Commonwealth is now provided with a Tuberculosis Dispensary where the indigent may secure free treatment, free advice, and the usual supplies required to prevent dissemination of the disease, and in case of great need, eggs and milk. This division at the present time includes a total of 348.

Later appropriations for Tuberculosis—$2,000,000 in 1909—enabled the Department to increase the size of Mont Alto Sanatorium. Today it accommodates nearly 800 patients and will, when buildings now under construction are completed, accommodate more than 1,000 patients. Contracts have been awarded for building one additional sanatorium with large provision for advanced cases in the Allegheny mountains west of the centre of the state on the beautiful tract of land presented to the Commonwealth by Mr. Andrew Carnegie. Land has been purchased near Hamburg, southeast of the centre of the Commonwealth, and a third sanatorium will be erected at this point as soon as additional funds are appropriated.

LABORATORIES. A well equipped laboratory is an essential part of every public health organization, Through the liberality of the University of Pennsylvania, opportunity was afforded to organize a Laboratory Division that should place at the disposal of the physicians of the Common-

wealth skilled scientists whose services could be given to diagnostic work, and liberal provision was made for conducting research work. In this laboratory the Department not only undertakes to study blood, urine, sputum and cultures and complete chemical and bacteriological analyses of water supplies and effluents from sewage disposal works, but pathological tissues are carefully studied from the standpoint of morbid pathology as well as from the standpoint of the pathologic histologist, the diagnosis in each instance being forwarded to the family doctor.

Research work undertaken by this division is far reaching and permits officers to go into the field in times of epidemic for the purpose of studying unusual outbreaks of disease. It has permitted the development of a system of preparing tubercle bacilli products, after a plan worked out by the Commissioner, that are now being successfully used in our dispensaries and sanatorium.

Division of Distribution of Biological Products. Another important division of the Department's work is that of the distribution of biological products. Through this division, diphtheria antitoxin is supplied free of cost to the poor from 650 distributing stations, each located at a convenient point in large centres of population. Tetanus antitoxin is supplied through 67 distributors, one in each county. Vaccine virus is distributed for the use of the Department's field officers and for the poor in second-class townships and in charitable institutions unable to pay for it. Tubercle bacilli products, one an extract in seventeen dilutions and the other a suspension of dead bacilli in sixteen different dilutions are distributed to the 120 dispensaries and to the sanatorium.

The Accounting, Auditing and Purchasing Division audits all accounts and purchases all supplies except for office work, the latter being purchased by the Department of Public Grounds and Buildings.

The Division of Supplies carries in stock everything required for the work of the various field officers and the working staff of the State Capitol and distributes material on receipt of requisitions properly countersigned. The Division is practically a Department Store and shipping agency.

Educational Publicity. It will be seen by this brief description of a plan of organization that the Chiefs of each of the various divisions receive their reports from the sub-heads and field officers, that they in turn utilize these reports and compile them for forwarding to the Commissioner. In the office of the Commissioner these reports are all re-edited for purposes of public instruction. Everything of educational value gathered in the most remote corners of the Commonwealth is diverted through the Division Chief to the Commissioner and is by him reflected back to the public

through an important sub-division of his office staff devoting its time to editing department reports and promoting their publication. Indeed, this is one of the most valuable features of a public health campaign in any Commonwealth. Many avenues are open for such an educational campaign.

In addition to editing annual reports and summarizing all of the work done during the year, monthly bulletins are published and distributed to the physicians and health workers throughout the Commonwealth and adjoining Commonwealths, and weekly talks are given through the daily papers, educational stories being sent to all the great dailies; to some 900 small weekly newspapers throughout the country districts; a travelling tuberculosis and sanitary exhibit is maintained, giving public lectures in all large centres of population; papers are read before scientific societies, charitable organizations, Boards of Trade, Civic Clubs, Teachers' Institutes and various bodies interested in the welfare of the public; circulars of instructions are edited giving details of household isolation, quarantine and care of the sick, and the laity are constantly kept informed of all the work undertaken by the State Department of Health. In other words, these reports are rewritten and popularized by this important sub-division of the Commissioner's office staff.

You will have gathered from this meagre description that Pennsylvania's State Department of Health is a large organization and has many employes, a total of more than three thousand, shortly to be increased with the medical inspection of schools to 4,000 individuals. As public health workers you will be interested to know something of the method of remunerating those who do the work. Every one connected with the office work of the department, from the Commissioner down to the most humble employee, receives either a yearly or monthly salary. The local registrars are paid fees for forwarding death and birth certificates by the respective counties. The County Medical Inspectors receive $1.25 per hour and all expenses when at work. Health Officers are paid 40 cents per hour and expenses.

Tuberculosis Dispensary Chiefs receive $2.00 per hour, their assistants $1.25 and $1.00 per hour. Nurses in dispensaries are paid a monthly salary, those in the larger cities receiving more than those who work in country districts, and all are allowed their travelling expenses. The Sanatorium staff are paid stipulated salaries.

The subject of this paper is The Organization of a State Department of Health. As Pennsylvania has been used as an example, may we not hurriedly glance at some of the results which this organization has accomplished.

From June 1, 1907 to June 30, 1910, 3,301 patients had been admitted to our State Sanatorium for Tuberculosis at Mont Alto. Many patients have been discharged with the disease arrested, hundreds have been benefited, and many more whose cases were too far advanced to hope for much aid have, however, been made comfortable and happy and have been provided with a home where they would not be a source of danger to others.

From July 22, 1907, to June 30, 1910, 32,247 poor tuberculous sufferers had received the skilled medical aid and the attention of trained nurses which the Department's one hundred and fifteen dispensaries provide.

The death rate from tuberculosis in Pennsylvania had fallen from 134 to 120 per one hundred thousand of polulation in four years. This means a saving of 1,000 lives annually.

From October, 1905, when the state began its free distribution of diphtheria antitoxin among the poor, down to Dec. 31, 1909, 20,794 cases of this dread disease, mostly little children, were treated with the life saving serum. We know by statistics that without antitoxin 42 out of every 100 of these children would probably have died but with the aid of the State's antitoxin the death rate among these poor little sufferers was reduced to 8.48. Free antitoxin was also given in 15,125 cases, mostly children who had been in contact with the disease. All but a very few of these were absolutely protected against diphtheria. A very low estimate of the saving of child life resulting from the state's free distribution of diphtheria antitoxin since 1905 is about 8,000 lives—a pretty good investment of the taxpayer's money.

Throughout Pennsylvania our streams are slowly but surely being freed from pollution. Not so slowly either, when the records show that up to June 30, 1910, 21,730 private sources of stream pollution have been abated upon notice from the Department, not to speak of the thousands more that have been stopped through the moral influence of this work. Seventy-six modern sewage disposal plants have been either built or are in the progress of construction as approved by the state. Two hundred and thirty-six other municipalities and private sewage corporations are preparing to submit plans for sewage treatment, for only on condition of their so doing have they been permitted to extend their sewerage systems. Already 47 modern water filtration plants have been approved by the state and are either built or being erected.

And what of typhoid fever in view of all this work for pure water? In 1906, 56.5 out of every 100,000 people died from this disease; in 1907, 50.3; in 1908, 34.4; and in 1909, 23.9. That is, there are now living 2,363 people who, had the death rate of 1906 prevailed in 1909, would have died from typhoid.

In 1906 and 1907, the death rate in Pennsylvania per 1,000 of population was 16.5; in 1908, it had dropped to 15.7 and in 1909 to 15.3. At first glance this may not seem a remarkable diminution, but in a state with a population of more than 7,000,000 even a fractional decrease is a substantial gain. This appears when one figures precisely what this slight numerical drop means in the actual saving of human lives. Had the death rate of 1906 and 1907 prevailed in 1908, 5,519 more people would have died than actually succumbed. Had this same rate applied in 1909, instead of the decreased percentage recorded by the Department of Health, just 8,388 men, women and children now living and presumably in good health and spirits, would have died. In other words, these matter of fact statistics, when interpreted in their real relation to the welfare and happiness of the state, mean the saving to Pennsylvania of 13,907 lives in two years.

And we are going to fight on!

EXECUTIVE METHODS IN PREVENTIVE MEDICINE.*

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A few years ago there were practically no trained executives for public health work. There were few general rules for guidance. Because there was a chance for so much difference of opinion as to administration, and each case must be considered by itself, it seemed necessary to have boards of health. Because the questions were essentially local, and the dependence of one community upon another were not so clearly perceived as it is today, the work was conducted by local agencies and the state efforts were loosely supervisory and advisory.

Today all is changed. Modern commercial methods and advance of sanitary science have demonstrated that the residents of a city like Chicago or New York are almost as vitally interested in the administration of the health departments of the rural communities a hundred miles away, as they are within the city walls. Especially in the United States the science of preventive medicine has advanced far beyond its administration. We have consequently reached a turning point. General rules must be formulated and the methods should be radically changed. Efficiency in the future will depend in no small degree upon a clear perception of the legal duties and limitations of state health executives.

The membership in this Association includes representatives from governments widely differing in character. Methods which might be legal in Canada are not so in the United States, and systems which are advisable in Mexico, might be inefficient in other lands. "The real character of a governmental system is determined by the laws in accordance with which it is supposed to act, but also by extra-legal conditions and practices."[1] These practices which are nearly as binding as the written law must be recognized, though they may not appear in the study of the law alone. They originate from the history and education of the people.

Individual liberty is safeguarded by the separation of the three branches of government: legislative, executive and judicial. This separation is not as complete in England and her colonies as it is in the United States, where it is required by the national and state constitutions. That of Illinois, for example, provides that "no person, or collection of persons,

1. Goodnow, Principles of Administrative Law in U. S., p. 4.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

being one of these departments, shall exercise any power properly, belonging to either of the others, except as hereinafter expressly directed or permitted."[2] The exceptions are such as the veto power and impeachment trials. The Constitution of Mexico says:[3] "The supreme power of the Federation is divided for its exercise into legislative, executive and judicial. Two or more of these powers shall never be united in one person or corporation, nor the legislative power be deposited in one individual." Similar provisions are found in the Constitutions of other Latin-American nations.

By the Canadian Constitution, the British North America Act of 1867,[4] the initiative for certain kinds of legislation is reserved to the Governor General. In Belgium,[5] the King holds a third of the legislative power, and has the right of initiative upon legislative matters. And "the interpretation of laws by authority belongs only to the legislative power;"[6] but such interpretation is not really interpretation, but new legislation. It gives an uncurbed power for oppression, which would not be permitted in Anglican communities. So, too, if the executive and judicial powers are united, either in one person or in a body of men, tyranny becomes easy. Every citizen has rights and one of these is that he shall know that the strong arm of the law will protect and not oppress him.

In the United States therefore the law is above the government. "No man is so high as to be above the law. No officer of the Government may disregard it with impunity."[7] No officer, therefore, who belongs to an executive office has any legislative or judicial power; and if he seeks to exert such power he becomes legally liable for any damages which may result to any citizen. For a health executive to require scholars to be vaccinated before entering school is an unwarranted usurpation of legislative power, in the absence of epidemic, or a state statute so ordering.[8] To decide which diseases should be quarantined is essentially a judicial or legislative procedure which the courts will not permit to the executive.[9] It is undisputed in the American decisions that a Board of Health, or a health executive, have no legislative power whatever.

It is true that health departments may make rules and regulations, and it is often claimed by such departments that these rules and regulations have the force of law. That is a very unfortunate misconception. "It is a principle not questioned, that except where authorized by the Constitution, as in respect to municipalities, the legislature cannot delegate legislative powers—cannot confer on any body or person the power to

2. Art. III.
3. Article 50.
4. Sections 53 and 54.
5. Articles 26 and 27.
6. Article 28.
7. Miller, Constitution, p. 33.
8. Potts. v. Breen, 167 Ill. 67; State v. Burge, 70 N. W. R. 347; Jenkins v. Board of Education, 234 Ill. 422.
9. Kirk v. Wyman, 65 S. E. R. 387.

determine what shall be law. The legislature only must do this.[10]" There are numerous decisions to this effect.

"A regulation which is in effect legislation is in a just sense a regulation no longer. That is, as a regulation is a derivative, it must keep within the scope of the statute under which it is framed."[11] "What is allowed to to be done is anything within the law that is in execution of it; what is forbidden to be done is anything without the law that is in extension of it. In execution anything may be done that is administration, nothing may de bone that is legislation—is the principal distinction."[12] Thus, a statute provided for the free entry of animals for breeding purposes. The Secretary of the Treasury ruled that the collector must be satisfied that the animals were of superior quality. Court held this was legislation, not regulation.[13] So, too, when the Postmaster General ruled that second class matter should only include such publications as consisted of the current news, or miscellaneous literature, and excluded a collection of railroad timetables, the Court held the regulation to be legislation, and therefore void.[14] As to the power of the State Board of Health to order vaccination the Supreme Court of Illinois said:[15] "It had and could have no legislative power. Its duties were purely ministerial, and the provision of the statute authorizing the board to make such rules and regulations as it should from time to time deem necessary for the preservation or improvement of the public health cannot be held to confer that broad discretionary power contended for."

It is frequently necessary for every executive officer of government to interpret the laws for his own guidance. Only a court can give an authoritative interpretation. It is the duty of the executive to apply the law only. "All that is allowed to the administration is action within the scope of its authority."[16]

All public health authority is included in that which is commonly called police power. Unfortunately the habit of referring to certain public officers of the peace as policemen has caused sometimes a little confusion as to the meaning of the expression police power. Originally the term police referred to all the functions of municipal government. Later it was used to indicate all internal administration. Today it has come to mean that part of the administration of internal affairs which attempts to prevent the happening of evil and to suppress violations of the law.[17] Jeremy Benthem defined it as "a system of precaution, either for the prevention of crimes or calamities.[18]" It includes legislative acts, and is

10. State v. Young, 29 Minn. 551.
11. Wyman, Administrative Law, Sec. 133.
12. Wyman, Ad. Law, Sec. 99.
13. Morrill v. Jones, 106. U. S. 466.
14. Pub. Co. v. Payne, 30 Was. L. R. 339.
15. Potts v. Breen, 167 Ill. 67.
16. Wyman, Ad. Law, 136.
17. Goodnow, Municipal Government, p. 234.
18. Works, Ed. Ed., Part IX, p. 157.

by no means limited to the power of an executive to act under general statutes. "This extraordinary and dangerous power is not of constitutional origin or grant. It is institutional and inherent in government; and, as wisely remarked by Chief Justice Shaw, 'it is much easier to perceive and realize the existence and source of this power than to mark its boundaries or prescribe limits to its exercise.' * * * * Its summary exercise is always perilous to private right, and often cruelly unjust."[19] "The range of the internal police is wider than police power."[20]

The license of milk dealers,[21] the regulation of the practice of medicine,[22] and providing pure water for the citizens,[23] are illustrations of the use of police power. "This power is inherent in the state, and may be delegated to public corporations. It is usually exercised by state officials, or delegated to municipalities.[24]" Because of the dangerous nature of this power the courts are inclined to scrutinize very closely the methods of its application. The tendency is to leave less to the discretion of the administrator, and insist upon legislation by the proper body.

"In the United States, also, the police of public health and safety starts from the idea of nuisance. It is further based upon the principal that there is to be a legislative determination in great detail as to what are nuisances. There is not in this country any elaborate statute on the subject, and in those states where special legislation is permitted by the constitution much of the legislation is contained in statutes which affect only one city."[25] In this regard we are far behind England.

The quotation given above from Professor Goodnow is a just criticism upon our sanitary legislation. The restriction of infectious diseases in a dairy district or the lack of such regulation may have a great influence upon a municipality far distant. The city is unable to protect itself, for the reason that its officers have no authority outside its limits. It is difficult and expensive for it to keep inspectors or detectives traveling far from home.

Though much of the administration of health departments is in the hands of locally appointed or elected officers, it is really state work, even more so than that of police departments. Dillon says:[26] "It is important to bear in mind the before mentioned distinction between state officers—that is, officers whose duties concern the state at large, or the general public, although exercised within defined territorial limits—and municipal officers, whose functions relate exclusively to local concerns of the particu-

19. Ingersoll, Public Corp. 115.
20. Freund, Police Power, Sec. 23.
21. State V. Dupaquier, 46. La. Ann. 577; People v. Vandecarr, 81 App. Div. 128.
22. Watson v. Maryland, 30 S. C. R. 644; Dent v. State, 129 U. S. 114.
23. Kennedy v. Phelps, 10 La. Ann. 227; Suffield v. Hathaway, 44 Conn. 521; Smith v. Nashville 88 Tenn. 464.
24. Ingersoll, Pub. Corp. Sec. 19.
25. Goodnow, Munic. Gov. p. 271.
26. Municipal Corporations, Sec. 58.

lar municipality. The administration of justice, the preservation of the public peace and the like, although confined to local agencies, are matters of public concern; while the enforcement of municipal by-laws proper, the establishment of gasworks, the construction of sewers and the like, are matters which pertain to the municipality as distinguished from the state at large."[27] For this reason in a number of states it has been held that police officers may be appointed through state agencies, and when the municipality has immediate control it is acting as the agent of the state.[28] The state may fix the pay of municipal police.[29]

A theft or a murder, in one community, does not greatly endanger others. This is not true of infectious diseases. The negligence in San Francisco has spread the plague germs throughout a wide territory through the agency of the rats and ground squirrels. Our frequent and rapid modes of transportation afford an easy method for conveying disease, as well as persons or freight, from one section to another. Health administration, therefore, is a state affair, though the state may permit its constituent portions to administer the laws enacted. A city health officer is a public officer.[30]

According to the common law a state cannot be sued in tort, and most of the state constitutions specify that the state may not be so sued. So long as a state officer is acting within the law he is protected from action at law, even though he may have made a mistake, and though harm has thus resulted to a citizen. "The immunity of a state from suit is absolute and unqualified, and the constitutional provision securing it is not to be construed so as to place the state within the reach of the process of the court. Accordingly, it is equally well settled that a suit against the officers of a state to compel them to do acts which constitute a performance by one of its contracts, is in effect a suit against the state itself."[31] On the other hand, when an officer of government performs an act not contemplated by the law, he is therein regarded not as an officer, but as a private wrongdoer, and he is held liable for any harm resulting. As Wyman puts it, "If that officer, it may be proved, has deviated ever so little from his legal authority, if, with the best of intention, or with the best of intelligence, he makes a mistake of fact applying the law to a particular case, he is by the principle doctrine, if applied to its logical conclusion, liable as a private wrongdoer, and responsible in such damages as may be proved."[32]

Counties and townships, being only quasi corporations created arbitrarily by the state for convenience in the care of the public business, are

27. Citing, People v. Hurlburt, 24 Mich. 44; Chicago v. Wright, 69 Ill. 326; People v. Draper, 15 N. Y. 543; Wolsey, 95 N. Y. 135; etc. Fairlie, Munic. Adm. p. 142.
28. Fairlie, Munic. Adm. p. 142; Dillon, Mun. Corp. Sec. 40.
29. Baltimore v. State, 15 Md. 376.
30. Throop, Public Officers, Sec. 10; In re Whiting, 2 Barb. 513.
31. Pennoyer v. McConnaughy, 140 U. S. 1.
32. Administrative Law. Sec. 15.

regarded as portions of the state, and equally protected from suits at law, for the torts of their officers.[33] Municipalities, being public corporations, are liable for the acts of their officers when within the law.[34] Health administration has been recognized as in nature governmental, and so protected from action at law,[35] but this will be the more apparent if the local officer is working under a general statute, rather than under a local ordinance. Moreover, since the state is the source of the police power, state statutes have greater force than local ordinances, and they provide a uniform system rather than the confusion which results from relying upon municipal regulation.

Speaking of American administration generally, Mr. Ashley says: "The state executives are ill organized and weak;"[36] and Prof. Goodnow tells us: "The experience of the world is against the administrative arrangements of the states of the American Union."[37] This weakness is strongly shown in the lack of individual responsibility, and technical training, which is a logical result of intrusting the work to political boards.

For over six hundred years the executive powers of Switzerland have been reposed in a council; but that federation is not a nation in the same sense as the United States. At the founding of our nation there were many who feared to trust the executive office of the government to one man, and at first several states voted against that proposition. The Federalist[38] contains a full discussion of the point.

Chief Justice Story has given the subject a somewhat lengthly discussion in his commentary on the Constitution. The argument applies equally well to public health administration. "That unity is conducive to energy will scarcely be disputed. Decision, activity, secrecy, and despatch, will generally characterize the proceedings of one man in a much more eminent degree than the proceedings of a greater number; and in proportion as the number is increased, these qualities will be diminished."[39] "This unity may be destroyed in two ways: first, by vesting the power in two or more magistrates of equal dignity; secondly, by vesting it ostensibly in one man, subject, however, in whole or in part, to the control and advice of a council."[40] Although discussions are beneficial in legislation, after a law is enacted there is no longer occasion for discussion. It is the duty of the executive to administer the law. "No favorable circumstances palliate or atone for the disadvantages of dissention in the executive department. The evils here are pure and unmixed. They embarass and weaken every

33. Barber Co. v. Horn, 48 Ala., 649; Mower v. Leicester, 9 Mass. 247; Elliott, Munic. Corp., Sec. 298.
34. Elliott, Munic. Corp. Sec. 298; Ingersoll, Pub. Corp. Chap. XVI.
35. Levy v. Mayor, 1 Sanford (N. Y.), 465.
36. Local and Central Govt., p. 327.
37. Prin. of Ad. Law, p. 133.
38. Number 70.
39. Sec. 1420. See also 2 Opinions of Attorneys General 482, and 7 Opin., Atty. Gen., 453, 470.
40. Sec. 1421.

plan to which they relate, from the first step to the final conclusion. They constantly counteract the most important ingredients in the executive character—vigor, expedition, and certainty of action."[41] "But the multiplication of voices in the business of the executive renders it difficult to fix the responsibility of either kind; for it is perpetually shifted from one to another. It often becomes impossible, amidst mutual accusations, to determine upon whom the blame ought to rest."[42] The magistrate sinks into comparative insignificance—compelled to follow when he should lead—blamed for acts over which he has no control.

Mr. Justice Miller says:[43] "The nearer we approach to individual responsibility in the executive, the nearer will it come to perfection." Because responsibility is more surely fixed with one executive than with a board, he is more easily restrained from abuse of power, as Delolme has pointed out. There too we have the additional stimulus of personal pride for good work.

A chain is only as strong as its weakest link. Admittedly, today, there are few competent health administrators. The position requires a special education and training such as finds practically no field outside of the public service. The service demands the very best that can be found. It is a practical impossibility to appoint a board of competent sanitarians of equal value. Every member of a board below the best man for this special work, no matter how competent he may be in other lines, is so much dead weight upon the administration. He may be positively antagonistic to good work, on account of his ignorance of the science of public health. He may even help to force the board into some ultra vires tort, for which the competent man who has been overruled, will be held equally liable, legally.

The professional health administrator should be the real head of the department. Whereas, in Prussia and France, the professional administrator is only subject to a general and financial supervision or control, in England "the unprofessional administrators are supreme; they are the authorities, and the salaried experts are merely their agents and servants."[44] This is not an indication of good business sense. It is not productive of efficiency nor economy, yet the United States has adopted the English policy. So we find that the trained sanitarian (if employed at all) is generally subject to, and hampered by, a board of health composed of men who know little of the science of public health, which is as distinct from the practice of medicine, as is that of dentistry.

41. Sec. 1424.
42. Sec. 1425.
43. Constitution, p. 94.
44. Percy Ashley, Local and Central Gov. p. 13.

These boards are generally unpaid. There is no more reason why physicians should give their services in the interest of public health, than there is that lawyers should donate judicial services, or that bankers should freely part with the use of funds for needed public improvement. Such a board may be positively harmful by giving a false sense of protection to the community. Therefore, the general practitioner of medicine who, while not a sanitary expert, accepts appointment upon an unpaid board of health, and does not use every endeavor to secure such a change as shall turn the authority to a salaried expert, is a disgrace to his profession.

The state health department therefore should consist of one man, with his subordinates. Each subordinate should be responsible to his superior for some particular portion of the work, and the chief executive should be held responsible to the people only through the office of the chief executive of the state—the Governor. The work through the state should be uniform. The territory should be divided into districts, after the manner in England. For example, each county should have a commissioner of health, appointed locally, subject to the approval of the state commissioner, and holding office during efficient service. He should be recognized in the law as County Commissioner, and a deputy State Commissioner. Likewise municipal commissioners should be deputy county commissioners. While it is in harmony with American institutions to leave the appointment of local officials to local authorities, and such a system should be fostered, yet such appointments should be to some degree under the supervision of the state executive of health.[45] Appointments should be made with a sole regard to professional efficiency, and should not be dependent upon the previous residence of the candidate within the territory to which he may be appointed. A non-resident is eligible to office unless the contrary is provided by statute.[46]

The right of the state to control local police appointments has already been mentioned. The only way in which an executive may be held responsible for the conduct of his office is by permitting him to appoint his subordinates. An executive has that right.[47] That right seems so important that Mr. Justice Miller devotes much space to the consideration of the infringement upon the constitutional provisions in the present practice of permitting members of Congress to select appointive officers in their respective territories.[48] Still, the power to appoint to office is not an inherent executive function.[49]

45. "The administration of the public health and public charity and the preservation of the peace, cannot be left to localities free of all central control."—Goodnow, Princ. of Ad. Law, p. 58.

46. Com. v. Jones, 12 Pa. 365; State v. George, 23 Fla. 585.

47. Wyman, Ad. Law, 48.

48. Constitution, p. 156, and ff.

49. Elliott, Munic. Corp. 259, citing Fox. v. McDonald, 101 Ala. 46; State v. Boucher, 3. N. Dak. 389; People v. Freeman, 80 Cal. 233; Goodnow, Princ. Ad. Law, p. 98.

Executive duties are ministerial or discretionary. When a specific duty is imposed by the statutes in a mandatory way, the executive power is purely ministerial. If he is permitted to use his judgment, his function is said to be discretionary. "If an officer has discretion he may do any act within that discretion; and all that he does will be held to have been done by express authorization of law. On the other hand, if the duty of the officer is ministerial only, that very act which he had been directed to do can be held to have been done with authorization of law. Therefore, if he acts beyond this express authorization, his acts will be held to be void.[50]

Discretionary power does not imply that the executive may do whatever pleases himself. The action must not be arbitrary, but must be reasonable for the object intended. "The meaning of the term discretionary, when granted by the law, either expressly or by implication, in connection with official duty, is that the discretionary decision shall be the outcome of examination and consideration. In other words, that it shall constitute the discharge of official duty and not be a mere expression of personal will."[51] "It not infrequently happens that the statutes require particular things to be done that must be made to depend upon the judgment—discretion—of a designated officer, and the discretion in such cases is not arbitrary, it is lawful and must be lawfully executed," and an officer is personally liable and amenable for abuse of that discretion.[52] "It follows that boards of health may not deprive any person of his property or his liberty, unless the deprivation is made to appear, by due inquiry, to be reasonably necessary to the public health."[53]

This provision as to reasonableness applies also to legislation, and a law which does not clearly attain the object sought, and with the least oppression, will be declared unconstitutional.[54] An ordinance requiring 3½ per cent. of butter fat in milk is not unreasonable, though it does suppose an unusual degree of care of the cattle.[55] A city may not create a monopoly.[56] The state legislature may pass laws which municipalities would not be permitted to pass.[57] An ordinance cannot be held as unreasonable and void which is expressly authorized by the legislature.[58] So, though creating a monopoly in making a contract for the collection of garbage, the city of Indianapolis was expressly authorized in its charter.[59] Questions of policy determined by the legislature are held conclusive by the court, and not subject to court revision.[60] It is not unreasonable to

50. Wyman, Admin. Law, Sec. 83.
51. U. S. V. Douglas 19 D. C. 99.
52. State v. Yopp, 97, N. C. 478.
53. Kirk v. Wyman, 65 S. E. R. (S. C.) 387.
54. Minnesota v. Barber, 136 U. S. 313; R. R. Co. v. Husen, 5. Otto, 465.
55. Weigand v. Dist. of Col., 22 Appeals D. C. 559.
56. Chicago v. Rumpff, 45 Ill. 90; Landberg v. Chicago, 237 Ill. 117.
57. Jenkins v. Board of Education, 234 Ill. 422.
58. Coal Float Co. v. City of Jefferson, 112 Ind. 15; Cooley, Cons. Lim. 241.
59. Walker v. Jameson, 140 Ind. 591.
60. License Cases, 5 Wall. 462, and 475.

require by law that a druggist shall know the standard of the drugs which he sells[61] or that a dealer should know the standard of the milk which he sells.[62]

Problems of discretionary administration are not always questions of right and wrong, but policy must be used to prevent such opposition as may defeat the end desired.[63] An ordinance in the city of Washington provided for the purchase of milk by an inspector, requiring the dealer to sell "a sample sufficient for the purpose of analysis." An inspector asked for half a pint, but the dealer refused to sell less than a pint, as he sold only full bottles.[64] The court upheld the dealer. On the other hand, an ordinance requiring the dealer to give not exceeding half a pint of milk for analysis was sustained.[65]

The Constitutions of some states[66] provide for special opinions from the supreme courts upon questions submitted by the Governor, Council, or Legislature. Such opinions are not conclusive, as abstract considerations have not the same value as concrete examples. In all cases much depends upon the way a case is presented to a court, and in health administration much depends upon the executive statement of the case.

It is sometimes argued that public health legislation should be in the most general terms, leaving wide discretion to the executive. Professor Freund says:[67] "The maxim of this (police) power is that every individual must submit to such restraints in the exercise of his liberty or of his rights of property as may be required to remove or reduce the danger of the abuse of those rights on the part of those who are unskillful, careless or unscrupulous." By the same principle the community must be protected from the negligence or misdeeds of unskillful, careless or dishonest health executives. There is no portion of the governmental power which possesses greater power for good or ill than the health department. Experience shows that the opportunities afforded have sometimes been used unscrupulously. The greater the latitude of discretion the greater will be the possibility for harm, and the more difficult will it be to curb the injurious effects. It is worth while to consider the opinion of Daniel Webster when he says:[68] "It is an error to suppose that liberty consists in a paucity of laws. If any one wants few laws let him go to Turkey. The Turk enjoys that blessing. That man is free who is protected from injury." Definiteness in legislation increases efficiency. Executive discretion is necessary in health administration, but it should be reduced to a minimum.

61. Dist. of Col., v. Lynham, 16 Appeals D. C. 185.
62. Commonwealth v. Wheeler, 91 N. E. R., 415.
63. See Goodnow, Princ. of Adm. Law, p. 10.
64. Dist. of Col. v. Garrison, 25 Appeals, D. C. 563.
65. State v. Dupaquier, 46. La. Ann. 577.
66. Maine, New Hampshire, Massachusetts and Missouri.
67. Police Power, Sec. 8.
68. Works, Vol II, p. 393.

Exact matters of detail in regard to vital statistics, or laboratory methods, and the conclusions drawn therefrom, may be largely left to subordinates who must of necessity do the work. A knowledge of administration law as applied to public health must be the main staff upon which a good health executive will depend, for his duties require the constant application of those principles, and decisions must be made primarily by him. This does not mean a knowledge of the letter of existing statutes, but rather an appreciation of those broader ideas of government upon which the state is founded. Such a knowledge as will give confidence in execution, celerity of decision, and definiteness of effort must increase the efficiency of all health departments.

In other words, the head of the department should be a professional administrator with a broad knowledge of sanitary science; not merely a sanitarian, nor a party politician.

An army does not consist of generals alone. Neither does the health department of a state consist only, or chiefly, of general officers whose post is at the capitol. Municipal, county and state officials must be recognized as integral parts of one organization. A resident official should be much better able to make a local inspection than a stranger, for he should know the peculiarities of the industrial and social conditions of the populace, and the topography of the ground, better than a stranger. While legally, the state commissioner must be superior to the municipal director, it will often happen that the opinion of the subordinate will be of more value than that of the superior. At least once a year, therefore, there should be a conference of general and county officers. Though such a council would have no legal legislative authority, it might very properly discuss and prepare suitable bills for submission to the legislature. Such bills should be submitted to the Governor in an annual report. Frequent district conferences would help to unify the work, and if they were made public, the educational value for the citizens would aid in effectiveness.

THE RELATION BETWEEN STATE AND MUNICIPAL BOARDS OF HEALTH.*

By C. A. HARPER, M. D.,
Secretary of the Wisconsin State Board of Health.

The wording of the subject assigned me assumes the existence of a central Board of Health or a Health Commissioner and local municipal organizations.

Since the sins of omission or failure to act on the part of the local Boards of Health usually entirely over-shadows the sins of commission, I look at this topic as one of progression rather than retrogression. Rarely do we find a local Board of Health perniciously active.

Having a local health organization, the question is how can we best promote the cause of public health work? I believe the local Board of Health should be selected by the municipal unit for a period of four terms, and held directly responsible to the people of the community in which the specific health measures are most readily made applicable.

In addition to the local Board of Health organization, there should be a county or district health official, preferably a district, who has general supervision over circumscribed localities, for the purpose of directing the work of the local health official, and making the necessary inspections from time to time as the exigencies of the conditions may necessitate.

Over the county or district health officer should be the State Board of Health or the Health Commissioner, as the custom in the various states may dictate. The Supreme Court of the United States directs that the police power in its broader sense includes every function of civil government, and all measures for the protection of the living and health, the property and the welfare of the inhabitants, and even goes so far as to promote good order and public morals.

Most generally, and certainly most important and far-reaching exercise, is the preservation of the public health.

A state may not divest itself of the police power. It may, however, delegate such power to the various services of government which it creates. This power should be given to local Health Boards and freely exercised by them. At the present time, in the United States, there are various methods of outlining the health organizations. Whatever organization

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may be found in any of the various states, the police power should be specifically understood and the various health authorities made fully acquainted with the meaning of such power.

By such an organization of the health forces within the common welfare, I believe that less friction would be found than would exist under methods that have been proposed from time to time in which the central Board of Health or Health Commissioner might have power to appoint the entire health officer force of the state.

Should such a power exist within the Board of Health, the temptation of diverting the public health measures toward a political organization might be too great at times to be successfully combated. By having the municipal Board of Health unit selected by the municipality itself, the political element or power, as far as the State Board or Health Commissioner might be concerned, would be eliminated.

I maintain, however, that the county or district health officer should be nominated by the central Board of Health. It might be a reasonable measure to have such nomination ratified by the supervisors of the district or county. With this class of health officers, however, the central Board of Health should have the power of removing upon sufficient cause, and thereby hold such officials more directly responsible to the central Board of Health. Such a procedure would eliminate local prejudices, and make the district official feel independent as far as the citizens under his immediate control were concerned.

All power that may be delegated to any board of commissioners should be delegated to the central Board of Health. This board should be advisory in the main, but should be clothed by legislative enactment with such effective authority to determine very freely any reasonable appeal that might be made to it arising from the violation of any public health measure. Such a procedure is only reasonable and just.

The various court organizations of a commonwealth ascend the ladder of authority until the Suprene Court of a state is reached. Such a procedure is also exemplified in the public school system of the various states, a certain unit being established with an intermediate agency or agencies, but usually with one controlling head or institution as far as educational advantages are concerned. Most certainly public health measures should take equal rank in importance, as far as the welfare of the people may be concerned, with the school system or court system of any commonwealth.

The State Board of Health or Health Commissioner should not only have jurisdiction and power of giving advice upon measures pertaining to the welfare of the people, but it should be clothed with the police authority of making investigations at any and all times, and under practically

any and all conditions, in any locality under its jurisdiction in which the application or carrying out of public health measures may be questioned. I believe that the State Board of Health should always have the right to exercise this power whenever in its judgment the conditions would demand such exercise of authority. The question arises as to the expenses that might be incurred in carrying out public health measures, and particularly is this true when the State Board of Health or Health Commissioner may be called upon to act. I believe that two methods of meeting the expense account between the State Board of Health and local Boards of Health should be practiced. When the State Board of Health acts in advisory capacity or investigates upon its own responsibility, the expense of such investigation should be met by the state as a whole. If, however, investigations are made necessary on the part of the State Board of Health in localities where a Health Board is organized, but inefficient, and therefore failing to perform its full duties as far as the interest of the people is concerned, then investigation made by the State Board of Health should be met by the municipality in which such expenses are necessarily incurred. This applies to the Vital Statistics branch also. A provision of this type tends to increase local interest, appeals to the pocket-book of the individual, and therefore is more likely to bring about active measure on the part of the local Board of Health.

My observation has been, however, since we have such powers granted us in the State of Wisconsin, that much greater efficiency can be obtained on the part of the local Board of Health by appealing to the financial side of the situation. Of course we expect that in the course of a few years the vast majority of the people will be so educated that pub-health measures and preventive medicine will be paramount in the public mind, rather than down at the end of the list where it has so long had an unenviable position.

Another provision as far as municipal and central Boards of Health are concerned, is to have some legislative protection thrown around any and all of these organizations against personal financial loss. Unfortunately in the past, when local health authorities are active in the exercising of their duties, and property is destroyed for the benefit of the public, the individuals affected by such destruction of property may have recourse in law for the recovery in damages. Under the present conditions in this state, and I believe similar conditions exist in other states, the state does not stand back of the local health authorities in their acts, but the individuals themselves are liable for damages unless it can be shown in the trial at court that the destruction of property is made absolutely necessary for the protection of the general public.

This tends, in many instances, to make the health officials slow in performing or advancing certain sanitary measures, which, were the officials properly protected by law, could and would readily be advocated.

Matters which concern the state as a whole, such as quarantine, the protection of public water supplies, etc., should be regulated by the central Board of Health, and its rulings should be final as far as the local Boards of Health or district and county health officials are concerned.

The legislature should empower the State Board of Health, or the Health Commissioner, with the power to make rules and regulations concerning certain fundamental forces affecting the health of the people, and when these rules and regulations are made public through the official sources, they should have the effect of law.

It is well to have a general statutory provision which places a penalty clause, with fine or imprisonment, or both fine and imprisonment, upon any rules that the state or local Board of Health may make, providing there is no special penalty clause in the particular provision under consideration. This general penalty clause adds much in putting stamina in the various local Boards of Health.

The central Board of Health or Health Commissioner should make its rules and regulations, which would be applicable to all the citizens under its jurisdiction. These rules should be more or less specific, so that neither the local Board of Health, County Health Officer, nor District Health Officer could violate without rendering themselves liable under penalty. It appears essential from experience that while there is a system of rules adopted by the central health organization, this should not prevent the adoption of further rules by the local health authority in order to meet conditions that may arise in certain specific localities. These rules should not conflict with rules adopted by State Departments.

The relation, therefore, between the State Board of Health or Health Commissioner and the municipal health authorities should be one of cooperation with a centralization of power.

The interchange of ideas, and the knowledge required by each health officer in knowing how other health officers do their work and meet certain emergencies, fully justifies in my mind the labor and expense incident to holding state or district conferences. If the Health Officer expects to impart knowledge to others he must know his subject thoroughly and realize the important roll which sanitation and public hygiene play in the prevention of diseases.

In addition to a general conference I am confident that local conferences should be held, and the State Board of Health and Health Commissioner should be empowered to hold local conferences at such place as the

central body may dictate for the purpose of working out some specific condition.

Since health officers are so poorly paid there should be a provision in the statutes providing that the expense of attendance upon one of these conferences should be met by the municipality sending its representative. Attendance at such conferences should be made compulsory.

I deem it of great importance that some generalized plan be worked out which could be made applicable in the main to the large number of states in the United States. The sooner sanitarians can agree upon certain fundamental bases for exercising and carrying out its effective authority, just that much stronger will the confidence of the people be placed in the beneficent effects of wise public health administration.

Of course, the constitutions of the various states may differ in the granting of powers, and therefore the health organizations must be in accord with the provisions of the constitution.

A multitude of different methods or laws pertaining to any one measure weakens the cause along that particular line materially.

Laboratory Section

THE PRESERVATION OF SEWAGE BY THE AID OF CHLOROFORM AND COLD STORAGE.*

By ARTHUR LEDERER and HARRY B. HOMMON,
Sewage Testing Station of the Sanitary District of Chicago.

In the operation of a Sewage Disposal Plant a very important problem is the collection, storage and preservation of sewage samples for analysis. The question of collection is important because any failure to get a representative sample of the twenty-four hour flow means a failure in the determination of the efficiency of a plant or a particular purification device. It is a well known fact that the composition of sewage will vary hour by hour very considerably even in a dry weather flow.

In a sewage disposal plant which has for its object the purification of one particular sewage and where analyses are made daily, a sample taken once every hour for twenty-four hours, can be conceded as giving a fair average of the daily composition. This refers to the chemical control. The question of bacterial control is much more complicated. In most sewage disposal plants it is a physical impossibility to make enough bacterial examinations in twenty-four hours, especially of the crude and grit chamber sewage, to give absolutely correct figures for one day. This is one of the reasons why we have to rely so much more upon chemical results.

In the outfall of a combined sewerage system of large size, the sewage is either very low in dissolved oxygen (usually in the cold season) or absolutely devoid of dissolved oxygen during the warm months of the year. The chemical changes which a putrescible liquid like sewage is subject to, play an important part where the question of storage and addition of preservatives enter. Ordinary fresh sewage will readily decompose on standing. The "Standard Methods of Water Analysis" consider six hours as a fairly reasonable maximum limit which may last between the collection of a sample and the beginning of its analysis under ordinary conditions. In comparatively few cases will a laboratory be in a position to examine a sample within the first six hours. In our experiments we have studied the

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changes which take place in a longer period than six hours. Ordinarily twenty-four hours elapse before the constituents, or part of the constituents, are determined. Very often the changes occurring during storage are overlooked entirely and the samples are allowed to stay at room or ice-box temperatures for a longer period. The change taking place at both temperatures has been investigated and determinations made of the organic nitrogen, free ammonia, nitrates and nitrites at definite intervals. By the determination of these four constituents we obtain the best clue to the changes which occur. During the investigation the room temperature varied, inside of narrow limits, between 25° C. and 28° C., and the cold storage temperature between 10° C. and 12° C. All the experiments have been conducted with RAW, UNFILTERED SEWAGE. The removal of the suspended matter by filtration would give entirely unreliable results which could have no bearing upon the actual conditions under which the analysis of sewage samples is ordinarily carried on. The removal of the suspended matter would simply mean the removal of the greater part of putrescible substances, the behavior of which has to be studied. Fresh sewage only was collected for the experiments.

Simple storage of fresh sewage at room temperature has shown reductions varying between 1.0 to 2.5 p. p. m. of organic nitrogen and increases of 0.8 to 5.0 p. p. m. of free ammonia during the first six hours. The results have been obtained repeatedly. Therefore the analysis of fresh sewage should not be delayed even for six hours if no means of preservation is provided. The change of the nitrogenous constituents in the first twenty-four hours indicates markedly the decomposition which has occurred. The great changes go on during the first forty-eight hours; after forty-eight hours the decrease of organic nitrogen on one hand and increase of free ammonia on the other hand is comparatively slow.

Since the custom has arisen in many sewage disposal plants of keeping composite samples of sewage with a preservative for a week, or even a month or longer before analysis, we endeavored to collate the practice as well as the opinion of laboratory men and sanitary engineers, on the question of preservation of sewage. A circular letter was sent to thirty-four State Board of Health and private laboratories asking for this information. Seventeen gave definite information. When sewage samples could be analyzed the same day, no preservative was used by any of the laboratories. Where preservatives were used, chloroform was given the preference by all but one laboratory. The amount of choloroform used by the different laboratories varies from 5 to 40 c. c. in 4 liters of sewage. On account of the diverse practice we have endeavored to ascertain to what extent chloroform does preserve sewage, and if so, how long, as well as the quantity necessary to absolutely assure preservation.

The quantities of chloroform used in this investigation vary from 1 c. c. to 40 c. c. in 4 liters of sewage. Unfiltered sewages exclusively have been used in this investigation. An investigation by Gage and Adams, published in the Supplement Number II, February, 1906, of the Journal of Infectious Diseases, deals with the question of the preservation of filtered sewages and effluents by the aid of chloroform. The question of the precipitation of collodial matter and consequent influence upon the ratio of soluble and insoluble solids has not been considered by us in this paper. At the sewage testing station of the Sanitary District, the schedule calls for the collection of hourly portions to make a twenty-four composite sample of crude sewage, ten c. c. of chloroform being added to 4 liters, the samples being kept on ice during the collection and analyzed within six hours after the last portion is taken. We have not noticed a single sample among some five thousand samples of crude sewages and sewage effluents in which the chloroform has caused a precipitation of collodial matter. In the effluent of a sprinkling filter especially would such a precipitation be immediately apparent. The addition of 40 c. c. of chloroform to 4 liters may produce a cloudy sample. However, this matter of precipitation depends upon the character of the sewage or effluent and the amount of chloroform added.

The addition of 5 c. c. of chloroform to 4 liters of sewage seemed sufficient to arrest further changes in the nitrites and nitrates; therefore, the determination of these constituents was dropped. Chloroform in the amount of 5 c. c. to 4 liters does not suffice, however, at room temperature. The twenty-four hour changes are distinct.

In order to ascertain the effect of 5 c. c. of chloroform on 4 liters of sewage as compared to straight storage at room temperature, a large sample of sewage was divided into two parts. Thus it could be demonstrated that the inhibitive effect upon the decomposition of the organic nitrogen and upon the free ammonia was fairly decided, but still decomposition went on rigorously. In one case, for instance, the organic nitrogen in the blank sewage decreased 2.24 p. p. m., in the chloroformed sewage only 0.80 p. p. m. during 6 hours, in the same period the free ammonia increased 3.96 p. p. m. in the blank sewage and 2.46 p. p. m. in the chloroformed sewage. Other results have been more or less similar for the 6 hours, 1 day and 2 day periods.

We have also investigated the influence of chloroform (in the proportion of 5 c. c. to 4 liters) upon the bacterial count during 2 weeks' warm storage. Blank determinations have been made for comparison. The samples were plated out on litmus lactose agar and incubated for forty-eight hours at 38° C.

The result is remarkable in that the number of bacteria in the chloroformed sewage increase rapidly while the bacteria in the blank sewage decrease gradually but decidedly. Other determinations, not tabulated, verified this. Only one conclusion is possible, and this is that 5 c. c. of chloroform added to 4 liters of raw, unfiltered sewage, at 22° C. storage, not only does not act as a bacterial poison but rather favors the development of one or more particular groups of bacterial organisms. This is confirmed by the rapid multiplication of the spore formers during the tests.

Another point often overlooked is the correction of the determination of the "oxygen consumed" for the chloroform added. There is a decided difference due to the presence of chloroform. Some investigations were made to find what the correction in the calculation of the "oxygen consumed" should be. The experiments have shown that where only 5 c. c. of chloroform in one gallon of sewage is used an appreciable error is introduced by not correcting for the chloroform. 10 c. c. of chloroform to 4 liters of sewage is a proportion that is used frequently.

When using 10 c. c. of chloroform we noted again that chloroform did not prevent a decided change during the first six hours, but has checked it to some extent. In one case, the organic nitrogen in the blank sewage decreased 2.24 p. p. m., in the chloroformed sewage 0.50 p. p. m. during six hours; in the same period the free ammonia increased 3.96 p. p. m. in the blank sewage and 2.33 p. p. m. in the chloroformed sewage. The differences are still more marked after 24 hours.

Ten c. c. of chloroform to 4 liters of sewage at 22° C. decreases effectively the number of bacterial organisms. Simple warm storage tends likewise to diminish the total number of bacteria within 2 weeks, as has been noted previously in the 5 c. c. chloroform bacterial count.

When using 20 c. c. of chloroform to 4 liters of sewage, we note a check in the decomposition, but action goes on rapidly in spite of the addition of chloroform.

Since the amount of chloroform used to preserve sewage may reach 40 c. c. per liter, investigations were made on this concentration. There seems hardly any necessity for adding more chloroform than is soluble in water, since it is the water soluble part of the chloroform which preserves, if any preserving property exists. The experiments have proven that 40 c. c. of chloroform in warm storage has no more preservative influence on the sewage than 20 c. c. of chloroform. The conclusion to be drawn is that although chloroform does retard decomposition to a slight extent it does not preserve sewage at room temperature, even if added in large quantities.

The analyses made to show the effect of cold storage upon sewage samples demonstrates that cold exercises a remarkable preserving influence upon sewages, and that cold storage apparently is far better than any amount of chloroform added to a sample kept at room temperature, as far as the organic nitrogen and free ammonia is concerned. Out of many analyses made, one may suffice. We found, for instance, in one case, that the organic nitrogen decreased to the extent of 0.86 p. p. m. in 24 hours, and 1.88 p. p. m. in 48 hours; on the other hand, the free ammonia increased 1.90 p. p. m. in 24 hours and did not further increase during the following 24 hours. The nitrites and nitrates tended to decrease quickly as they have done in the warm storage experiments.

In comparing the warm and cold storage experiments, the striking feature is the change in the nitrogenous constituents. During warm storage it is large in comparison with cold storage. There is no doubt that cold storage should be used in preference to warm storage and chloroform when sewages have to be kept previous to analysis. Analyses were made on sewages containing 5 c. c., 10 c. c., 20 c. c., and 40 c., c., of chloroform which have been exposed to cold storage for various lengths of time. Judging by the results obtained, the decrease of the organic nitrogen and the increase of free ammonia in the cold storage samples is influenced by the increasing amounts of chloroform to some extent. If the sewage collected for analysis was fresh and contained some dissolved oxygen, the initial changes in the blank and chloroformed sewage were decided. In such samples it has been found that cold storage alone is a fairly good preservative, much better than warm storage with chloroform. When the sewage is stale, the change in the organic nitrogen and free ammonia is comparatively slow. As far as the nitrites and nitrates are concerned, there is no doubt that the chloroform is effective. In a very large number of experiments not tabulated here, the nitrites disappeared inside of the first few hours at room temperature, as well as cold storage, without chloroform. With the addition of chloroform the nitrites remained stable for at least 24 hours in most cases. The same holds true for the nitrates. While they diminished rapidly in the unchloroformed samples, they remained fairly stable in the chloroformed sewage.

We find again a decided increase of the total bacteria in the 5 c. c. chloroform experiment during a period extending for two weeks, the same as it is shown in warm storage, while the bacteria in the blank sewage decreased. Ten c. c. and 20 c. c. of chloroform proved effective here as before.

We seem justified from these investigations to draw the following conclusions:

1. It is not advisable to store fresh sewages at room temperature pervious to analysis. Even six hours storage will produce perceptible changes in the nitrogenous constituents.

2. The addition of chloroform in amounts of 5 c. c. to 20 c. c. to 4 liters of sewage checks decomposition to some extent. However, even in the presence of chloroform, decomposition takes place so rapidly at room temperature that an immediate analysis becomes necessary when no other methods of effective preservation can be resorted to.

3. Simple cold storage has a pronounced preservative effect upon sewages. It does not inhibit the decomposition completely, but it justifies a short delay before making an analysis.

4. The addition of chloroform to a sewage in cold storage seems to have some influence in checking the decomposition of the organic nitrogen and the free ammonia. However, cold storage without chloroform will have a better effect than warm storage with chloroform upon the organic nitrogen and free ammonia.

5. Inasmuch as chloroform is effective in checking the decomposition of organic nitrogen and free ammonia to some extent and effectively prevents a decrease of nitrates and nitrites, the writers believe that cold storage with the addition of 10 c. c. of chloroform to 4 liters of sewage should be followed in preference to storage at room temperature with the addition of chloroform and in preference to cold storage alone.

6. It is highly desirable that a preservative be found for sewage which should be odorless and colorless. Neither should it change any of the constituents present in the sewage or interfere with any analytical determination. It should be effective at room temperature for a reasonable length of time.

REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIOLOGICAL DIAGNOSIS OF TUBERCULOSIS.*

During the past year your Committee has conducted studies along the lines suggested last year and begs to make the following report:

The diagnosis of tuberculosis by bacteriological methods in the laboratory is applicable in four different ways. First, and most important, the examination of sputum. Second, the examination of urine. Third, the examination of pus and other discharges. Fourth, the examination of tissues.

We believe that public health laboratories should undertake the first three of these examinations as a matter of routine. However, we recognize that tuberculosis is spread chiefly by means of sputum. The examination of the other materials must be determined by the facilities of any given laboratory.

Directions for collecting sputum: We recommend that laboratories supply outfits for collecting sputum, consisting of a wide mouthed bottle of about 30 c. c. capacity, with a cork stopper, and suitably packed for mailing. It is better to put three to five c. c. of a 5% solution of carbolic acid in each bottle. Enclosed with the bottle is a leaflet giving directions for collecting sputum, and blank for the name of the physician sending in the case, the patient's name, date of collection, and other data which circumstances in the laboratory render important. The directions for collecting sputum are as follows:

The first sputum raised in the morning is preferred. If this expectoration is scanty, save the entire amount coughed up in twenty-four hours. Be careful to avoid the contents of the stomach, particles of food, etc. Give only what is coughed up from the lung. Be sure that the cork is tightly inserted into the bottle and that the outside of the bottle is well washed off before packing.

Directions for collecting urine: This should always be done by a physician or a competent nurse. Great care should be taken to wash the meatus thoroughly, and the urine should be drawn with a sterile catheter into a sterile bottle (rubber or glass stopper), with the utmost precautions to avoid contamination, and sent at once to the laboratory. If from a distance it should be packed on ice. In place of ice, antiformin may be added in the proportion of ten per cent. by volume.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

Directions for collecting pus: Pus from a freshly opened abscess is to be preferred. If an old sinus exists it should be scraped with a dull curette, and the scrapings be sent with as much pus as possible. Sputum bottles are convenient for the transportation of such material, but the carbolic acid should first be washed out with sterile water.

Fourth. Tissues should be sent wrapped in sterile gauze and packed on ice.

Examination of sputum. For staining, carbol fuchsin is recommended. For decolorization, a mixture consisting of five parts nitric acid and ninety-five parts of 95% alcohol is the most convenient. Those preferring them may use any of the mineral acids up to 10%, but we advise against very strong solutions of acid. Ten bacilli should be found before calling any specimen positive. In the routine examination of sputum, shaking, as recommended by Rickards,* has been found a most useful procedure.

Should the specimen prove negative by the methods so far recommended a substance recently introduced under the trade name, "Antiformin," may be used. Antiformin is composed of equal parts of liquor soda chlorinatae, U. S. P., and a 15% solution of caustic soda. It is used as follows: Mix equal amounts of the sputum and a 15% solution of antiformin. Shake for ten minutes, or until all masses are dissolved, and add normal salt solution up to 15 c. c. Centrifugate for twenty minutes. Decant supernatant fluid and wash sediment by adding distilled water and again centrifugating. This should be repeated three times. (The committee has withdrawn its recommendation for the treatment of sputum with a 2% caustic potash solution on account of the injury done to the staining properties of the tubercle bacillus. Antiformin has a similar action though it is apparently much less marked.)

For routine work the slide or cover slip after being spread should be completely covered with carbol fuchsin and heated gently until vapor shows itself for five minutes before decolorization. If bacilli are not shown by this method, the slide may be immersed for twenty-four hours in cold carbol fuchsin. We find that where the number of bacilli is small this is a much more certain method of revealing them than the rapid stain.

Pus is to be examined in the same manner.

Urine should be centrifugated, the supernatant fluid poured off, distilled water added, and a second centrifugation done. This is best repeated three times and the sediment finally examined as for sputum. Special care must be exercised in fixing the sediment, however. If dried slowly,

* Jour. of Inf. Dis., 1907, Sup. 3, p. 119-122.

the danger of washing off is largely avoided. The addition of a 10% solution of egg white is also useful in fixing the sediment to the slide.

In examinations of all material it may be necessary to resort to animal inoculation. In cases of genito-urinary tuberculosis animal inoculation must always be resorted to before making a positive diagnosis. Antiformin as described above is especially useful in preparing material for inoculation.

In the examination of tissues the method proposed by Mallory and Wright is perhaps the best.

The routine differentiation of the tubercle bacillus from the smegma bacillus is best made by the method of Dahms, but animal inoculation should be resorted to in doubtful cases.

The method of differentiating true bacilli from other members of the acid fast group, devised by Fontes,* is recommended in doubtful cases. We append it with notes of our experience.

(a) Stain preparation by ordinary carbol fuchsin method.

(b) Wash in tap water.

(c) Stain about two minutes with carbol crystal violet (carbol gentian violet gave better results).

(d) Treat with Lugol Solution until no more metallic mirrors are found. (Decolorization is more easily affected if at this point the preparation is blotted thoroughly).

(e) Treat with aceton-alcohol. (Equal parts of aceton and alcohol. Wash until the stain ceases to wash out.)

(f) Wash in distilled water.

(g) Stain with methylene blue.

MAZYCK P. RAVENEL, Chairman.

*Cent. B. I. Feb. 26, 1909.

Section of Municipal Health Officers

REPORT OF COMMITTEE ON FOODS.

The task given this committee was that of reporting generally upon foods, and especially upon the question of oversight of milk and water supplies. In gathering information for this report an attempt was made to collect data concerning recent actions of city governments in the matter of adoption of more efficient regulations for controlling food and water supplies. Knowledge as to novel methods of oversight or unusual results from routine inspections was also sought, as were suggestions looking towards improved supervision of food and water supplies.

FOOD STUFFS.

The movement towards more efficient protection of foods, and especially those of the uncooked type, is fortunately becoming widespread.

Boston, a pioneer in this progressive measure, has commenced the prosecution of dealers failing to comply with this regulation, and these actions have resulted favorably to the government.

Washington has a new ordinance aimed at unwholesome food, and this measure also requires more effectual protection of foods in transit through the street, or exposed for sale thereon. More vigorous prosecution of violations of sanitary regulations in this last named city, as applied to the handling and sale of food stuffs, has in five months reduced the ratio of inspections to prosecutions from 1 to 28, to 1 to 45. The Health Department has also begun to prosecute without notice dealers who expose for sale unsound food products; the Washington authorities believe there should be daily inspections of foods offered for sale in retail stores, as in these establishments there is the greatest deterioration of perishable goods.

Seattle also seeks to safeguard food products during transit, and by a recent ordinance all foods, unless properly protected, shall be raised at least two feet above the floor level, and when so raised must be protected from insect life.

Brockton, Mass., seeks to exclude dust and flies from a large variety of vegetables and other food, and such products must be so kept as to be free from contamination from dogs.

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

Salt Lake City requires that foods must be kept 18 inches above the sidewalks, and also provides for the protection of an extensive variety of products, including bread, cake, pastry, candy and confectionery, from dust, dirt and insects, by screens or suitable coverings.

Minneapolis has a new ordinance compelling the licensing of butcher shops, for which there is an obligatory fee. This measure gives the authorities power of rigid oversight of these premises, protects foods from dust and dirt, and prohibits handling by customers, the latter being a novel and praiseworthy measure. The Health Department uses a score card in controlling these establishments.

Seattle has a stringent ordinance regulating bake shops. These establishments are required to provide separate toilets for the different sexes; baths must be furnished, and the employees are required to wear white clothing with sandals and caps. Employees must furnish the Commissioner of Health with a certificate, sworn to by some accredited physician, as to their health, and such certificate must be filed within 24 hours of commencement of service. No person suffering from tuberculosis, syphilis or any venereal disease, or any skin affection, is allowed to work in a bakery. Bake shops must also have direct sunlight and be kept within specified temperature limits.

WATER SUPPLIES.

The control of the water consumed by the inhabitants of any city or town is of vital importance from the health standpoint, and while the past has witnessed the expenditure of vast sums of money in an endeavor to provide ample supplies of pure water and for protection of the same from contamination, the welfare of communities and increase in population will entail the output of further and larger sums to ensure abundant and unpolluted water for the future. Owing to the vastness of this problem and its influence, not only upon the community using a specific supply, but upon those so situated as likely to become contaminating influences, it is believed that the best results can only be attained by state intervention and co-operation with municipal authorities.

New Orleans is spending $28,000,000 for efficient water and sewage systems. The filtration and power plant for this city cost $2,000,000, and has been such a success that bacteriological examination has thus far failed to reveal the presence of pathogenic bacteria.

Montreal is purifying its water by means of calcium hypochlorite and is now considering the installation of a filtration plant.

Ottawa has employed an engineer to investigate its supply and report on the possibilities of its purification. By reason of a recent outbreak of

typhoid fever, Milwaukee was compelled to install a temporary chlorination plant. The providing of a permanent supply of safe water for that city is still under consideration.

Springfield, Mass., has recently installed a new supply, and placed a slow sand filter in operation, by which all of the water now being delivered to the city is being filtered. Chemical and bacteriological tests are made daily. On the fifty miles of water-shed of the new supply, vaults and cesspools are provided for the use of householders, and the city also undertakes the care of all wastes, in order to minimize pollution.

San Francisco provides bi-weekly chemical and bacteriological examinations of water from all sources. The presence of *B. coli*, or an excess of nitrites, is followed by the immediate closing of the supply until the contaminating influences are eliminated.

Seattle, in addition to weekly examinations, maintains a daily patrol system of its water-shed. The work of this patrol is checked graphically by an unique map system, which is sent daily to the Health Department. All trains, when running through this water-shed, are required by law to lock their closets, and the railroads have been compelled to build dikes between the river and their tracks, as well as to construct water-tight bridges, whenever they have crossed any source of water supply.

Baltimore is about to begin the long delayed construction of a filtration plant for the treatment of the water supply of that city.

The character of the water used in Buffalo is ascertained by daily bacteriological tests, and its quality is made known through the public press.

The health authorities of Washington subject the water from wells, both public and private, to chemical and bacteriological examination. Those contaminated are closed, where it is not possible to remove the source of pollution.

Late last year Richmond installed a new system which combines a storage system with four large basins, a change of intake, and the employment of a coagulant. This method has lessened the turbidity and decreased the bacteria, and the treated water has proven satisfactory from every point of view.

Control of water in the form of ice is also attempted by regulation in Chicago, Boston and Brockton, (Mass.) The two last named cities prohibit the sale of ice which by chemical or batceriological tests shows evidence of sewage contamination, or which is visibly polluted by dirt, or ice in or upon which there is any visible foreign matter.

MILK.

While great progress can be noted in the way of improved milk supplies, the principal drawback to pronounced and immediate success in this development is the inertia on the part of the public. Insufficient interest and a desire to procure milk at the lowest price, regardless of quality, are the factors chiefly responsible for this attitude of consumers. Meanwhile, during the period that health officials are teaching the public that unclean, unwholesome milk is a dangerous food product, and that clean milk, like a sealskin garment, is more expensive, and justly so, than its shoddy substitute, we are paying an annual toll in the way of infantile mortality, which will be materially reduced when the public exercises the necessary discrimination and intelligence in the purchase, care and use of milk. Less money spent on millinery and beer and more devoted to procuring clean milk will yield health dividends more than commensurate with the capital thus invested. The presentation and apparently necessary constant reiteration of this text is a task which health officials must assume in order that educational milk campaigns may attain the maximum benefit to consumers.

Investigation denotes much interest on the part of health authorities relative to the inauguration of methods tending to improve milk supplies. New Orleans and Shreveport (La.) have greatly amplified their systems of inspection. The State has just adopted a chemical standard for milk which is proving satisfactory to all parties. The Board of Health of that State has just adopted the score card system for dairies and has commenced making chemical and bacteriological examinations.

The health authorities at Washington believe that bacteriological examinations should be used as a check on the sanitary inspection of places where milk is produced and handled.

Chicago has adopted a regulation requiring sellers of bottled milk to have the names of the person, firm or corporation selling the milk on all bottles or caps used in making such sales. In the enforcement of the bacteriological standard, one action, which resulted favorably to the government, was brought to the attention of the courts.

Boston has inaugurated dairy inspection on a large scale; there have been prosecutions for the sale of milk containing dirt, also where milk was found with an excess of bacteria. After an unparalleled agitation, the regulation requiring the sale of milk in bottles, or other tightly closed or capped containers, went into effect June 15th, and has met with general compliance. Where shopkeepers have refused or neglected to inaugurate this system, licenses have been revoked. From these revocations there

can be an appeal to the State Board of Health, and some of those whose licenses have been revoked have taken advantage of this provision of the law. The adjudication of these appeals is now pending.

Montreal prohibits the sale of milk over 24 hours old, except in the case of milk which, within 8 hours after milking in summer, and 12 hours in winter, has been sterilized, or which has undergone any other treatment approved by the local authorities. This city has also increased its milk inspection staff and a special system has been inaugurated for country service.

Portland, Me., requires all milk to be from tuberculin tested cows.

Salt Lake City, through the operation of its temperature regulation and score card system, has brought about vast improvement in its supply. In that city milk and cream are excluded from all dairies having a rating of less than 50, when scored according to the system of the United States Department of Agriculture.

The health officer of Jacksonville, Fla., after a strenuous educational campaign, succeeded in having an ordinance passed regulating the production, handling, and sale of milk, which carries with it a provision for obligatory enforcement.

At Rochester, N. Y., cards are distributed to the people in the vicinity of milk stations, calling attention to the advantages from the use of clean milk which the city furnishes for infant feeding; parents are also urged to "come and learn how to keep the baby well during hot weather." A plan has recently been placed in operation for the procuring by visiting nurses of medical and social data relating to the families that visit the milk stations; the information so gleaned is recorded on specially devised forms.

Milwaukee reports excellent results from the employment of the score card system; in Minneapolis a regulation requiring the sale of bottled milk in shops is about to be offered.

Buffalo has a specialized milk division with inspection of dairy farms and of all places within the city where milk is handled; samples are procured at the railroad stations and tested daily. Depending upon the bacterial count, of which 500,000 per c. c. is the maximum, milk is interdicted. It is also interdicted for bad or unsanitary surroundings.

The subject of ice cream is also receiving attention. Boston has a regulation requiring its preparation under sanitary surroundings and making it necessary for all employees to wear clean clothing. The number of bacteria is limited by this regulation to 500,000 per c. c. Cleveland is contemplating action relative to this subject. The State of Louisiana has adopted a fat standard of 14 per cent. for this product, and Maryland has just adopted a law limiting the amounts of vegetable gum and gela-

tine to 1 per cent., and requiring a fat content of at least 4 per cent. Notice by labels must be given where ice cream contains artificial flavoring or over 1 per cent. of vegetable gum or gelatine.

Two factors, which may be fairly considered within the scope of the committee, have been brought to our attention during these investigations. One is that of inadequate appropriations and working force for the accomplishment of health work. We believe this contention is justly made and that the condition is almost universal. The maximum results cannot be attained under these circumstances, and the policy of city governments in pursuing a niggardly course in the treatment of health matters cannot be too strongly condemned. Liberal appropriations and intelligent expenditure is both essential and necessary where the health of communities is the chief consideration. Tax payers should insist on the proper share of their contributions being so utilized.

The other and important feature, and one to be recommended, is that of educational work in all health subjects by means of the public press. Keeping the left hand in ignorance of what the right hand is doing is not a good policy in dealing with health subjects. In Salt Lake City this method has been utilized with gratifying results, so that it is now estimated that dairymen, in consequence of the agitation, have been compelled to spend large sums of money upon improvements, and public sentiment has been aroused to such an extent as to compel recognition from even the courts. At Jacksonville, Fla., public opinion in favor of the new milk ordinance was only aroused by means of the daily papers and the influence of the Board of Trade and Women's Club. The health officials of Buffalo consider publicity in all industries depending upon public patronage such as restaurants, bakeries, meat markets and the like, as the most forcible of all auxiliary aids in securing the standard of sanitation. Chicago has utilized the public prints persistently and with good results.

Another aid to publicity is the bulletins issued by health departments. This means is used in many cities and it has proved so efficient in Seattle as to warrant the opinion that much of the backing and support of the health board by the people is attributable to this cause.

James O. Jordan, Chairman.
T. H. Baker.
George W. Goler.

Section on Vital Statistics

THE NEED OF EXACT ACCOUNTING FOR STILL-BIRTHS.

By JOHN S. FULTON, M. D.,
Baltimore, Md.

There are cogent reasons for desiring uniformity of understanding and practice in the registration of still-births in all parts of the world, but in the Unites States the immediate and pressing reason is that an extraordinary diversity of understanding and practice almost destroys the credibility and comparability of our mortality statistics. Certainly no registrar will contend that very young lives should be excluded from the population account, or that still-births should be included in the mortality account. All are agreed on these two propositions, and yet our mortality statistics would be better understood if all under one year of age were left out of both population and mortality.

A complete account, whether of the living or the dead, is most difficult to obtain, under the age of one year. To the inherent difficulties of accounting for life and death in early infancy, we add in this country the avoidable difficulty of variable definition and treatment of the returned mortality of early infancy. Many registrars give no account whatever of still-births, and where still-births are accounted for, the term "still-birth" is not defined. The mortality of early infancy is everywhere so large that a small discount sensibly affects the total death rate. The exclusion of one from the death list produces, in this country, about the same error as the fictitious addition of fifty to the population.

We do not find that American registrars, in general, are careful to publish the number of the dead who are not counted in the death rates, though it is generally understood that non-residents and the still-born are omitted. The city of St. Paul furnishes an example of frank publication of numbers excluded from the mortality rate on account of tender age. In that city deaths of infants under two weeks of age do not figure in the death rate. The age distribution of the living and of the dead in St. Paul is such that the omission of one from the mortality factor is about equivalent to the

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

addition of seventy-five to the population. Whenever two hundred deaths of infants under two weeks are omitted from the mortality rate about the same error is produced as if the population were inflated three and four-fifths per cent., enough to create the illusion of one point reduction in the total death rate for all ages. These infants are excluded because they were less than two weeks of age, but if a registrar should desire to omit such infants under the vague title of "still-births," there is no common understanding among registrars to restrain him.

In one European country infants dying well above the age of two weeks are regularly counted as still-births under certain circumstances. The law of that country permits an interval of a month to elapse between the date of birth and the date of registration of the birth. If death occurs in the first month, and it happens that the record of death reaches the registration office ahead of the record of birth the death may be treated as a still-birth.

Irregularities in the statistical treatment of infant deaths are a cause of concern to registrars and health officers in all countries. In 1893, a Committee of the House of Commons on Death Certificates recommended that "Still-births which have reached the stage of development of seven months should be registered upon the certificate of a registered medical practitioner and it should not be permitted to bury or otherwise dispose of the still-birth until an order for burial has been issued by the registrar." Newsholme says that "If a child be born alive, no matter how soon it may die, both birth and death must be registered." Among the rules proposed by the U. S. Census Bureau are the following:

"Rule 5. Children born alive and living for any time whatever, no matter how brief, after birth, should not be classed as still-births, even though reported by the attending physicians or midwives as 'still-born.'

Rule 6. Whenever age in days, hours or minutes is reported for a still-born child, or indicated by a difference between the dates of birth and death, the registrar should secure a statement that will enable the case to be classed with certainty either as a still-birth or as a death. If no additional information can be obtained, the statement of age should govern and the case be compiled as a death and not as a still-birth."

If there is lack of agreement among registrars concerning the definition of a still-birth, among physicians there is no less confusion, and perhaps it is the registrar's task to furnish the needed definition. This vagueness of the medical mind perhaps has prompted the Census Bureau to insert in the standard certificate a supplementary under the seventh item, asking for a statement of age in hours or minutes in case of death on the day of birth.

It would seem easy to define a still-birth, since the preparation of a foetus for extra-uterine life is accomplished in a fairly definite time, and the inception of separate existence is announced by a very manifest physiological act, that of respiration. A babe which has uttered a cry, or performed one act of respiration, has started in the race of human life, and must be counted among the living from the first such act, even though it be counted among the dead after that breath. A delivered foetus, having a pulsating cord or muscular movement, is to be sure not dead, but until it has breathed it is not alive with the aerobic, life. If it fails to breathe, and so dies, it is as truly still-born as it would have been if it had attempted to breathe while in utero and so died by drowning. One of the best definitions of a still-birth says "a still-birth is an infant born during or after the seventh month of utero-gestation and dead without having breathed." The act of respiration is sufficient evidence of fitness to start an independent aerobic existence; better evidence, I suspect, than that on which the period of utero-gestation is sometimes estimated.

We are not likely to be embarrassed by such progress as may be expected in the preservation of infants born before the seventh month. Incubator infants should be counted alive while they live, and figure in the mortality rate when they die. They will never be numerous enough to complicate the mortality statistics.

In these days the necessity of studying the mortality of ante-natal existence is looming up, as the mortality of early infancy is more and more closely examined. For the major part of life we find that our ordinary needs are met by statements of mortality by five year periods. After eighty, we find that such statements are not sufficiently informing, and that expectancy is better expressed in months than in years. But the living are few above eighty, and their future is of small importance. At the beginning of life, however, we find the largest numbers and very important values. We have been a long time familiar with the tall column which begins the mortality curve with the tally of the dead under five years. It has sometimes to be omitted, when one desires to use a vertical scale liberal enough to bring out points in the mortality of adults. This tall column persists when the mortality of the first five years is stated by single years. It falls on the first month in a statement by months, on the first week in a statement by weeks and on the first day in a statement by days. The Census Bureau now publishes statements of mortality by single years under the age of five, and by months in the first year. English and French statisticians give mortality by days for very early infancy, and it would not be surprising if it were found generally advisable to dis-

tribute the mortality of the first two or three weeks by days. The infant mortality of England and Wales in 1907 was stated by single months for the first quarter, and by quarters for the remainder of the first year. From this statement one may derive the ordinates of a mortality curve for the first year by months. The values of these ordinates will be as follows, each figure expressing the mortality per one thousand infants born alive.

40.68, 13.38, 9.91, 8.32, 6.96, 6.28, 5.98, 5.57, 5.28, 5.06, 4.9, 4.78.

The same mortality is stated by weeks for the first three weeks and from this, with the aid of the statement by months, one can plot a curve for the mortality of the first twelve weeks. The ordinates are as follows, each expressing as before the mortality per thousand born alive:

24.39, 7.3, 5.86, 4.8, 4.25, 3.68, 3.35, 3.03, 2.87, 2.68, 2.48, 2.32, 2.2.

Here the figure for the second day has been raised from 5.98, the number given by the Registrar-General.

The mortality of the first day is given and the mortality of the following six days is given in one sum. From these, with the aid of the statement for each of three following weeks, one can obtain the probable ordinates of a curve for the mortality of the first twenty days. These are as follows:

11.34, 3.6, 2.75, 2.33, 1.93, 1.70, 1.47, 1.27, 1.12, 1.02, .93, .90, .87, .85, .84, .84, .82, .82.

Our own census report gives the mortality for the first twelve months separately and they make a fair curve, but the population figures for the same months are grossly defective. The deaths under one month in 1900, in the Registration States were 22,876, and living population at that age is reported to have been only 36,023. At that rate the extinction of the population is in sight. Everywhere the same difficulty is met in enumerating the very young and on this account it has become the practice in other countries to state the infant death rate in relation to the number born alive during the year. That is at present impossible in the United States.

We have seen that short intervals of time must necessarily be studied if we wish to understand the causes of death in the periods of life when the chances of death are strongest, namely at the beginning and end of the recognized span. Noting this tendency of mortality to concentrate on the first five years, on the first of these five, on the first month of the first year, on the first week of the first month, and on the first day of the first week, one is tempted to ask whether the center of effort in the preservation of infant life is located in external life at all, or in antenatal existence. In this connection it is interesting to metion the studies of Karl

Pearson, who was able to distinguish, not seven, but five stages of human life as indicated by the causes of death. Studying the chances of death from old age backward, he found successively three similar curves of probability, consistent with one another and corresponding to age, middle life and youth. The fourth curve was of different type. It terminated in a sharp decline to the point of origin in the third year, and distinguished the mortality of childhood from that of infancy as it was not itself distinguished at the other end from the three other curves. There was left, moreover, a set of figures for deaths of the very young, which failed to continue the story, until theory supplied certain information lacking in statistics, when the theoretical origin of the fifth curve was found to be three quarters of a year before birth. The center of death's aim at infant life, Pearson says, is in the last two months of ante-natal life, and there are, he says, 605 intrauterine deaths for each one thousand living births.

In order to test theory by experience, he secured from the Dublin Rotunda, St. Pancras Maternity, and the Lying-in Charity of Guy's Hospital, statements of their ratios of still-born to living births. For the Rotunda it was 6.9 per cent. from 1847 to 1854, and 6.1 from 1871 to 1875. For St. Pancras it was 3.86 per cent of 13,916 cases. For Guy's it was 3.84 per cent. of 25,777 cases. At first sight these figures compare poorly with the 37 per cent. ante-natal mortality theoretically obtained by Pearson. But the hospital figures account only for the mortality of the last few weeks of gestation, and Pearson's distribution of the 605 antenatal deaths fairly reconciles the apparent discrepancy. He says that 391 deaths occur in the first three months, 131 in the second three months, and 83 in the last three months. In other words, out of 1605 conceptions, 24.4 per cent. die in the first three months, 8.2 per cent. in the second three months, 5.1 per cent. in the last three months, and 62.3 per cent. result in living births. These figures, 391, 131, and 83, indicate a formula for ante-natal mortality strikingly like that of early infancy, and confirm the belief that infant mortality needs study in minuter relations to age.

In Pearson's conception of the five special agents of Death, the Special Messenger to infants is stationed, not, as the four others are, beside the pathway of life. He stands on the crown of the arch above the gateway of birth. His weapon is a skull. Bad parentage, Pearson says, is the principal cause of death in early infancy; babes are slain with the bones of their ancestors. If there is not fine accuracy, there is breadth of truth in Pearson's views about the five principal agents of Death, and particularly I think, in his definition of the center of aim of those deadly devices which beset early infancy.

The primary reason, therefore, for uniform and accurate practice in accounting for both living and dead at the threshold of life, is that at that point both living and dead are so numerous that any considerable error vitiates our numerical statements concerning life and death at all ages. The second, and, for the present, less urgent reason is that the master key to the problem of infant mortality is possibly concealed in the bodies and minds of the mothers of children.

Notes and Reviews*

MUNICIPAL SANITATION NOTES.

Dr. C. V. CHAPIN,
Providence, R. I.
(*Reviewer.*)

Profit from Garbage. A great deal has been heard from time to time about the profit to be derived from the utilization of municipal wastes, such as garbage, ashes and other refuse. Most of the statements which appear in the daily press, and even in sanitary journals, are entirely without foundation. Schemes are advertised for the utilization of grease, tankage, paper and junk, and for the production of heat, light and power, and the public is led to believe that the municipality can not only defray a part of the cost of collection, and disposal by such utilization, but can even make a net profit above all expenses. Often times it proves that the cost of utilization is as great, or even greater, than the value of the products saved, so that the total cost of disposal is not even lowered but rather increased. In no case, except the one to be referred to, has the writer ever known of an instance where the value of the products sold yielded a net profit over and above the cost of collection and disposal. In 1910 the city of Worcester obtained a net profit from its garbage, over and above the cost of collection and utilization. The total cost of collection that year was $27,721.29, and the cost of feeding it to swine on the Poor Farm was $11,318.39, thus making the total cost $39,039.68. The value of the pork and swine sold was $43,224.25, leaving a profit of $4,184.57. This phenomenal success was due, of course, to the exceptionally high price of pork in 1910, but for many years the city of Worcester has defrayed the larger part of the cost of collecting its garbage from the profits of its hog farm. The collection of garbage in Worcester is taken care of by the Overseers of the Poor, who feed the garbage to swine upon the Poor Farm. The success of this work is due chiefly to its management by Mr. T. T. Schouler, the Superintendent, whose knowledge of the business has been of so much

EDITOR'S NOTE. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

pecuniary advantage to his city. The feeding of garbage to swine is the only way in which its value can be economically utilized, and quite a number of New England cities, either directly or indirectly, receive financial benefit in this way. Of course, not every city is so situated that this method of disposal can be employed. The feeding of garbage to swine usually produces more or less nuisance, and a location in a sparsely settled section must be secured. Undoubtedly the nuisance could be very greatly reduced if sufficient attention were given to it by intelligent persons, and even now there are hog farms that are no more offensive, to say the least, than some crematories and rendering works. It is the writers' belief that more attention should be given to this method of garbage disposal. A careful study of methods would certainly result in a decided diminution of the nuisance which usually accompanies hog raising, and would also materially increase the profits of the business. Small herds of high grade swine are frequently fed on garbage with practically no nuisance and there is no reason why large herds cannot be managed in the same way. One of the greatest improvements which could be made in the collection of garbage would be to have the collections made daily during the summer months. If the money obtained from the sale of pork should be devoted to providing daily collection, it would be a great comfort to the householder, and owing to the fresher conditions of the garbage, would greatly aid the management of the hog business.

Builders' Privies. Notes are frequently found in health reports about the nuisance caused by the temporary privies constructed by contractors. These are usually poorly made and poorly cared for, and are frequently so placed as to be a nuisance to the adjoining property. Sanitary inspectors have a constant struggle to keep these privies in even a passible condition. In Hartford * it is insisted that the privy be removed at the earliest possible moment. Just as soon as the foundation walls are up, connection must be made with the sewer and a temporary water closet installed.

* Report of Board of Health, 1910, p. 46.

PERSONAL HYGIENE NOTES.

PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(Reviewer.)

Elements in Training. What is the source of the improvement in power and endurance observed when a muscle is regularly exercised? This interesting question has been much discussed but with the general result that the matter appears ever more involved. The number of factors concerned seems constantly to increase as we gain a closer view of neuromuscular physiology. Let us recount some of these factors, beginning with those which have long been recognized and concluding with some very recent suggestions that bear upon the problem.

The fact most familiar to the man in the street is that the active muscle grows. How this actual increase in contractile substance is brought about cannot be regarded as altogether clear. Different writers have emphasized the possible share of various conditions in contributing to the improved nutrition, some laying stress on the increased volume of blood-flow, others on the freer production and movement of lymph, and others upon the effect of fatigue-products. It has been suggested that the accumulation and escape of metabolites from the active cells may give rise to just the conditions which invite the appropriation of food. Actual wear and tear in a tissue seems to stimulate hypertrophy as we see in the formation of callouses in the skin.

While the increasing size of the muscle is an obvious feature of training it is likely to be made too prominent. Betterment of quality is doubtless more important. There is no proportion maintained between the augmented cross-section of the muscle and its efficiency. This is most strikingly true when we turn our attention from the question of absolute power to that of endurance tested through series of moderate contractions. Here we have to do with variations in susceptibility to fatigue and the question becomes a chemical one.

Training affects not simple the conditions within the muscle but also those at the governing centres. The writer has previously pointed out that an untrained muscle may be one in which there are many elements not brought under voluntary control. Perseverance in the use of such a muscle may lead to a reorganization of its centres, making possible a more

complete command of the contractile material. Central training furthermore establishes better co-ordination, eliminates the hindering of one muscle by another, and so secures speed, grace, and economy of effort.

Let us return to the question of the muscle itself. Resistance to fatigue may be variously accounted for. The most novel doctrine is that of Weichardt* who regards fatigue as a specific toxaemia against which the cells in course of time develop a definite antitoxin. The trained muscle is thus regarded as one which enjoys a measure of acquired immunity against a disease, fatigue. It is an immunity purchased at the cost of repeated attacks of the disease. According to this theory, extracts of powerful muscles introduced into the circulation of an untrained subject should render him hardy and enduring. Yet it would be unreasonable to expect too much from such injections, since there is no warrant for expecting that they would give the requisite cardiac and central support. In an article just published, Burridge (of Oxford) adds somewhat to our knowledge of these matters.† He admits the probability that there is a true fatigue toxin but at the same time demonstrates the importance of potassium salts and of lactic acid in lowering irritability. He finds that the end-plates (connecting links between nerve and muscle substance) are the vulnerable part of the system. This characteristic suggests the function of the safety-fuse in electrical devices to the extent that complex structures are shielded from injury by the sacrifice of something readily renewed.

Burridge brings forward the view that the neutralization of lactic acid in muscle is a function of the abundant extractive creatin. Physiologists have always been more or less at a loss to assign any function to this peculiar substance which is carried in the human tissues to an amount of several ounces. Now comes the suggestion that its presence is a measure of endurance. It would be interesting to know whether creatin is much more abundant in birds and animals possessed of great strength than in others. The "gamey" flavor of wild flesh may be assumed to indicate general richness in extractives, but exact analyses would be needed to determine the proportion of creatin. The chemical reaction between creatin and lactic acid is not given by Burridge but it is stated that creatinin is formed.

While endurance may thus depend in part upon the power to neutralize fatigue-substances, we must remember that a good supply of fuel is also essential. A research by Lusk‡ makes this clear. Carbohydrate,

*Münch. med Wchnsch. No. 1, 1904. No. 48, p. 2121, 1904.
†Journal of Physiology, 1910, XLI, p. 285.
‡American Journal of Physiology, 1911, XXVII, p. 427.

mostly held in the form of glycogen, appears to be the most available source of muscular energy. The glycogen of the body may be rapidly destroyed in contending against cold. Lusk has found that the severe measure of placing a man in an iced bath for some minutes and allowing him to shiver in a cool room afterward will swiftly deplete his hoard of glycogen. The disappearance of this reserve is recognized by a change in the ratio of oxygen consumption to carbon-dioxide production. Now although this principle holds for all subjects, the tabulation shows that it takes much longer to consume the glycogen of an athlete than to expend that of an untrained individual. Hence it is reasonable to infer that a part of the training process is the acquirement of the power to hold glycogen in generous amounts and in readiness to yield its energy on demand. If we combine the views of Burridge and of Lusk we shall conceive the trained muscle to be distinguished both by its high content of creatin and by the exceptional amount of carbohydrate which it holds.

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

It is a common impression among the uninformed that when a sample of water is submitted to a chemist for analysis, the latter bases his opinion as to the purity of the water entirely upon the absolute figures obtained. As a prominent chemist once remarked: "A proper interpretation of the results of a sanitary analysis of water is half the analysis.

The analytical data obtained from a sanitary analysis of water may be divided into two groups, biological and chemical. The question of which set of data has the greater amount of significance from the standpoint of Public Health is a perplexing problem to many observers. Take, for example, the following analyses of a surfcae water:

Parts per 1,000,000										Whole Nos. of Bacter. per c. c.	Fermentation Lactose bile	
Ammonia		Nitrite	Nitrate	Oxygen Consumed	Chlorine	Iron	Turbidity	Color	Hardness			
Free	Albuminoid										1 c. c.	1-10 c. c.
0.044	0.094	0.0024	0.9	4.7	3.5	1.5	15	27	168	1,500	Pos.	Neg.
0.022	0.288	0.0106	0.6	7.3	10.0	0.7	49	42	99	25,000	Pos.	Pos.

As the ammonias, nitrites, chlorines, oxygen consumed and bacteria are high, especially in the second sample, the analyst would be justified in condemning the water. The question would arise at once, then, is the water capable of purification? It is. This water can be freed from the turbidity which makes it unsightly, from the salts which make it bad for use in the laundry, and from the bacteria which produce disease—but the chlorine, nitrites, and part of the ammonia will pass through any system of purification (except distillation) practically unchanged. Few people realize this fact. This was illustrated a few months ago by the following incident: A physician, at the head of the chemical department in a medical college in a large city, condemned the public water supply before his classes on the ground that "The city water contains ammonia, chlorine, nitrite and sulphates in pronounced quantities showing that it is polluted." As a matter of fact, the water in question after passing through the city purification works, contained less than 10 bacteria per c. c. on the average, and was being consumed daily by more than 100,000 people with no apparent ill effects. Typhoid fever dropped off 75% in that city as

soon as the purification works started, ten doctors have since left town, and others report a decrease of from $500 to $2,000 in their annual incomes.

Nitrites, sulphates, and chlorides have no sanitary significance in such a water, even in the quantities indicated in the preceding table, for the purification process has removed the dangerous matter which was associated with them in the original source. Therefore the doctor was not justified in condemning the water upon the grounds which he quoted. It should be noted along this line that it is not at all uncommon to have intelligent persons submit a few pints of water, collected in an old whisky bottle or stone jug, to chemists for chemical and even for bacterial analyses, expecting the analyst to be able to tell from the tests whether the water is polluted. Ten chances to one some of the material found in the water would have come from dirt left in bottle before collecting the water.

No chemist or other person is justified in interpreting a water analysis without having full knowledge of the conditions which prevailed at the time of collection. The reason for this is well illustrated by the following example. Two men were sent out on consecutive days to collect water from a river at a certain bridge. One took his sample near the shore, the other went out into the middle of the bridge and filled his bottle from the main channel. Analyses proved that the shore sample contained over 100 parts per million of chlorine, but the channel sample had less than five parts. The reason for this discrepancy lay in the fact that a salt well emptied into the river a short distance above the bridge contaminating the water with chlorine from some deposit of salt deep in the ground. The presence of such a large quantity of chlorine would have justified the chemist in being very suspicious of the water had he not known that there was not a sewer or closet for twenty miles up river.

Waters taken from deep wells are apt to have a number of such special features. Nitrites are common and high nitrates. In regions where coal abounds the iron salts act upon the nitrates reducing them to nitrite. Therefore, while the presence of high nitrite is looked upon as a symptom of sewage pollution in surface waters subject to contamination from privies or house drains, there are many localities where nitrites found in well waters have little significance.

It is, then, of the utmost importance that full information should accompany every sample of water submitted for analysis.

DATA FROM WATER PURIFICATION WORKS—February, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins. Settling Basin: Period in Hours	Settling Basin Effluent: Turbidity	Settling Basin Effluent: Bacteria per c. c.	Coagulation Basin: Period in Hours	Coagulation Basin Effluent: Turbidity	Coagulation Basin Effluent: Bacteria per c. c.	Parts per 1,000,000 Unpurified Water: Turbidity	Unpurified Water: Color	Unpurified Water: Total Hardness	Purified Water: Turbidity	Purified Water: Color	Purified Water: Total Hardness	Nos. of Bacteria per Cu. Centimeter: Unpurified Water	Nos. of Bacteria: Purified Water	No. of Deaths from: All Causes	Typhoid Fever	Pulmonary Consumption
Albany, N. Y.	100,253	Hudson River.	16 rapid sand, 8 slow sand Filters and Disinfection.	21.8	2.9	18.	4	31,400	Combined with the sedimentation.			6	28	93	0	20	93	37,500	25	196	0	27
Cincinnati, O.	364,463	Ohio River	Rapid sand filters using iron and lime as a coagulant.	43.4	2.6	48.	105	5,000	10	16	900	190	...	62	0	...	72	15,000	10	...	1	...
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	14.1	1.0	18.	8	9	Combined with the sedimentation.			146	31	208	0	9	88	8,000	2	207	0	17
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	8.0	1.4	6.	...	....	1 5	....	36	21	65	31	0	0	32	15,000	4	95	...	4
McKeesport, Pa.	42,694	Yoghiogheny R.	Water softening and mechanical filtration.	3.4	0 3	20.	0	21	Combined with the sedimentation.				0	120	0	0	81	510	20	75	1	5
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using iron and lime as a coagulant.	14 2	0.8	4.	425	4,800	24	35	325	450	11	95	0	4	60	6,000	160	542	3	73
Toledo, O.	170,000	Maumee River	Mechanical filtration.	14.4	1.8	8.	12	514	Combined with the sedimentation.			544	32	...	0	7	...	36,400	23	226	2	...
Washington, D.C.	348,460	Potomac River	Sedimentation and slow sand filters with coagulation.	57.2	3.9	24.	27	9,490	72	15	4,960	111	0	54	0	0	54	12,300	83	535	4	61
Youngstown, O.	80,000	Mahoning River	Mechanical Filtration.	8.0	4.0	3.	20	3,000	Combined with the sedimentation.			73	24	54	0	0	56	22,900	96	97	2	6

NOTE:—The high numbers of bacteria found in the effluent at New Orleans during February were caused by Algae Growths. The system of Purification at Cincinnati consists of "Sedimentation without chemicals, sedimentation with chemicals and rapid sand filters.

PUBLIC HEALTH, NEWS AND NOTES.

B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Mass.*
(*Reviewer.*)

University of Illinois establishes new Chair in Municipal and Sanitary Dairying. The Daily Illini of March 25th contains the following under the head "New Professorship in Dairying is Established":

Burt R. Rickards, of Columbus, Ohio, who has been for two years chief of the laboratories of the Ohio State Board of Health, has just been appointed associate professor of municipal and sanitary dairying in the College of Agriculture.

Professor Rickards is a graduate of the Massachusetts Institute of Technology, 1899. From 1900 to 1908 he was assistant director and director of the Boston Board of Health Laboratory. * * * *

Professor Rickards will enter immediately upon his work at the University of Illinois. His coming will strengthen very greatly the dairy side of the work of the College of Agriculture. * * * *

Health Almanac. The Virginia Health Almanac for 1911 is the title given to the January-February Number of the Virginia Health Bulletin issued by the Board of Health of that state. In the foreword is the statement that the Department does not wish to impress the people once a year with an array of meaningless statistics, but wishes, as far as possible, to inform every citizen every day that much sickness is useless and much disease is preventable. The method is unique.

For each month a disease, especially apt to occur at that time, is singled out and a page of history or common exciting causes is given opposite the calendar for the month and under the calendar a few terse axioms appear. It is surely one which will be kept and referred to frequently.

The March number is devoted to the care of the teeth.

Illinois State Board of Health Bulletins. From Illinois has been received the monthly bulletins and their special bulletins on "The Care of the Baby, Scarlet Fever, Tuberculosis, Typhoid, Smallpox and Diphtheria, all of which are full of trite suggestions, but in the light of our present knowledge of the causation of diphtheria, it seems as if the last-named one should be revised, as it contains the following statement:

*State and City Boards of Health and other organizations are requested to send copies of their reports, bulletins, etc., to the above address for review.

"There is no doubt also, that sewer gas may be a carrier of diphtheritic poison and that many outbreaks hold a close relationship with defective drainage, sewers and cesspools."

There is also a request that the children be warned to rinse the school room drinking cup before using. How much better it would be if there were no school room drinking cups to warn against!

The January Bulletin is especially valuable. Nearly 60 pages are devoted to "The Tuberculin Test—Its Reliability, Efficiency and the Necessity of Its Adoption." Under this head are considered the important work, litigations and conferences on this subject.

Following this we find six pages dealing with pasteurization showing its advantages and objections.

This Bulletin should be read carefully by all who have the oversight of milk supplies.

Prevention of Blindness—Vermont. Among the laws relating to Public Health passed by the Vermont Legislature of 1910 are the following, taken from the Vermont Medical Monthly Volume XVII, No. 3: No. 73—An Act to provide for Medical Inspection of Public and Private Schools; No. 219—An Act to provide for the Registration of Nurses; No. 220—An Act for the Prevention of Blindness:

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. The State Board of Health are hereby empowered to make such rules and regulations as they may deem necessary for the prevention of blindness caused by the disease known as ophthalmia neonatorum, and they may furnish at public expense such prophylactic outfits as are necessary for the use of physicians.

SECTION 2. Any physician who fails to comply with the regulations established under Section 1 of this Act shall be fined ten dollars for each offense and it shall be the duty of the State's attorney to prosecute in all cases on complaint of a local board of health.

SECTION 3. This act shall take effect from its passage. Approved November 11, 1910.

The March number of the monthly bulletin of the Vermont State Board of Health has the following in regard to the above.

DIRECTIONS TO PHYSICIANS REGARDING THEIR PROCEDURE IN CASES OF OPHTHALMIA NEONATORUM.

Ophthalmia neonatorum is an inflammation of the eyes of the newborn baby, which is usually due to infection. If not properly treated, blindness may result. Hence the following routine treatment should be carried out in every case:

Should one or both eyes of an infant become inflamed, swollen and red, and have an unnatural discharge at any time within two weeks after its birth, the nurse, relative or other person having charge of such infant shall report in writing, within six

hours thereafter, to the local health officer of the town or city in which the parents of the infant reside, the fact that such inflammation, swelling and redness exists. Such health officer shall take such immediate action as may be necessary in order that the blindness may be prevented.

Ophthalmia Neonatorum and Infantile Paralysis Reportable in Vermont. There has been added to the list of reportable diseases, the following:

Anterior poliomyelitis, sometimes called infantile paralysis; Ophthalmia neonatorum. Cases of the above-named diseases shall be reported under Section 5454 of the Public Statutes.

Use of the Public Drinking Cup Prohibited in Vermont. At a meeting of the State Board of Health held February 9, the following regulation was adopted:

Whereas, it has been demonstrated that the use of what is known as the common drinking cup is dangerous to the public health and a source of communication of infectious diseases, therefore, under the authority of the statute imposed upon the State Board of Health to promulgate rules and regulations relative to the preservation of the public health in contagious diseases and prevention of the same, the use of the common drinking cup in all public places, parks, fountains, schoolhouses, factories, mills, work shops, libraries, public halls or other public buildings, railroad stations and railroad trains, is hereby prohibited from and after May 1, 1911.

Per order of the State Board of Health, Henry D. Holton, Secretary and Executive Officer, Brattleboro, Vermont, February 28, 1911.

Smallpox Bulletin—Oregon. The Oregon State Board of Health Bulletin October-December, 1910, is devoted to Smallpox and Vaccination, presenting the subject in a very convincing manner.

Distribution of Diphtheria Antitoxin—Texas. The State of Texas now furnishes* Antitoxin at a minimum price to those who can pay, and at the expense of the county or city for the poor.

The Value of Research in Public Health Laboratories. From the excellent report of the bacteriologist of the Province of Alberta, printed in the Annual Report of the Department of Agriculture for 1909 the following is taken.

RESEARCH.

"Just as it is the duty of every physician to endeavor continually to add to his knowledge of medicine and when possible to add to the general fund of medical knowledge, so it is a duty and a necessary function of every laboratory organization to carry on systematic research. Only by so doing can the laboratory maintain its vitality, make progress and realize its highest usefulness. The results of the research work should be published both in the appropriate scientific journals and also in the regular reports of the laboratory. A recognized place for research work in the activities of a

*Bulletin of the Texas State Board of Health, Feb., 1911.

laboratory attracts to its staff men of much higher ability and value than are otherwise obtainable even for adequate salaries. The public thus derives a double benefit from the judicious inclusion of research as one of the functions of the state laboratory.

Finally, a word as to educational work as a function of a public health laboratory. This is not a novel thing for such to undertake as part of its serious and routine business. It is useful and necessary work which can be well and successfully undertaken by the laboratory for several reasons: Its statements are accepted as authoritative; it has the necessary information for a proper campaign of instructing the people; it is in pretty close touch with most of the people who are directly in need of certain definite instruction; and such work can very often be most profitably combined with other duties—for instance, epidemiological investigation."

New Laboratories—Chicago Health Department. In the weekly Bulletin of February 25th, issued by the Department of Health of Chicago we find this statement:

"The Department of Health Laboratories on the seventh floor of the new City Hall, Washington Street Side, are now in working order. In arrangement, appointments and equipment, they no doubt are unequaled—certainly not excelled—by any municipal laboratories in the country. Separate rooms, each splendidly equipped, are provided for the different branches of laboratory work. The chemical laboratories for the chemical examinations of milk, water, food stuffs and general chemical work are in every way up to the latest standard of laboratory construction. The bacteriological division is also perfect in every detail, and with the best facilities for taking care of bacteriological work within the province of a municipal laboratory to do.

For the next two weeks only, the laboratories will be open to the public and those interested in laboratory work and methods will be made welcome."

To the writer it seems a great mistake to announce that the laboratory will be open for inspection for two weeks only as it should be a centre for education, open every day for inspection and instruction.

During the past two months there have been 205 signatures added to the visitors' books at the Boston Board of Health laboratory representing nine states, the District of Columbia, 3 Provinces, Italy and England and of this number 138 were students chiefly from the high schools of Boston. These were shown through the laboratory in small groups and the entire work explained; thus they obtained an idea of the scope of the work and each of them was shown the difference between clean and dirty milk. To further impress the lesson, many of the students were required by their teachers, who in many instances accompanied them, to write a composition telling what they saw.

Our book which has been kept just over two years has signatures from nearly every state, all the eastern provinces and many foreign countries—total number of signatures 1449, and of this number 425 are of the gentler sex.

Ellen H. Richards, Sanitary Chemist.—It is with great regret that we announce that Mrs. Ellen H. Richards passed away at her home in Boston on March 30th.

Mrs. Richards was almost 70 years old and yet in full possession of her faculties, so much so that she attended her classes only a few days before her death, and while still upon a sick bed and supposing herself to be convalescing, put the finishing touches upon an article which she intended to read before the Congress held at the Institute of Technology on April 10th. Mrs. Richards, whose maiden name was Ellen H. Swallow, was a native of Massachusetts and a graduate of Vassar College in the Class of 1870. After leaving Vassar she went to the Massachusetts Institute of Technology, where she graduated in Chemistry with the Degree of Bachelor of Science in 1873.

At the Institute she had the good fortune to come under the personal instruction of William Ripley Nichols, whose services to Sanitary Science, and especially the Science of Water Supply between 1869 and 1886, are well known. A little later Miss Swallow became a graduate student of, and a private assistant to Professor Nichols. Even after her marriage to Professor R. H. Richards of the Institute of Technology she kept up and extended her interest and labors in Sanitary Chemistry. When Professor Nichols was succeeded by Dr. T. M. Drown, Mrs. Richards took charge of the Laboratory of Water Analysis and when the newly reorganized State Board of Health of Massachusetts undertook the problem of the examination of the inland waters of that State, Mrs. Richards, under the general direction of Professor Drown, undertook a large part of the work. This culminated, as many of our readers know well, in the normal chlorine map of Massachusetts, which was the first thing of the kind prepared in any country. This work for the State Board of Health of Massachusetts covered several years and when the 10,000th sample of water came in for analysis a little celebration was held in the Laboratory, greatly to Mrs. Richards' delight. More recently her Laboratory has been perfected and still further improved, her interest in it having remained unabated from that day to this, and a host of students, men and women, having here received their first training in Sanitary Chemistry.

Mrs. Richards was, however, more than a water analyst, more than a Sanitary Chemist. She was a great teacher, and reckoned among her pupils thousands of women all over the country in women's clubs, congresses, schools and colleges who read her books and papers and listened with eagerness to her thoughtful expositions of domestic science and sanitary subjects. She was a leading exponent of the idea that science

ought to be applied to the household, as the titles of various of her books amply testify. Most of these, moreover, have a more or less direct sanitary bearing, as will be readily seen from the titles of some of them, such for example, as her latest, "Conservation by Sanitation," "Home Sanitation" (with Dean Talbot of Chicago University); "Air, Water and Food" (with Professor Woodman of the Institute of Technology); "The Cost of Food"; "The Cost of Shelter"; "Sanitation in Daily Life"; "The Cost of Cleanliness"; "The Cost of Living as Modified by Sanitary Science"; "Industrial Water Analysis"; "Food Materials and Their Adulterations": "The Chemistry of Cooking and Cleaning," etc., etc.

It is doubtful if Mrs. Richards leaves any successor. Her own career, bringing her as it did into close contact with two of the ablest sanitary chemists of the last half century; her extraordinary opportunities in connection with the State Board of Health of Massachusetts; her official position as Instructor in Sanitary Chemistry in the Massachusetts Institute of Technology over a long period of years; together with her natural participation and logical influence in the rise of modern movements in sanitation, applied biology and public health education—all these separately and together contributed to make her a marked and unusual figure.

Those who have had the privilege of being associated with her as fellow students, teachers or workers, can best realize the extent of the loss which public health science has suffered by her death.

WM. T. SEDGWICK.

SANITARY ENGINEERING NOTES.

R. S. WESTON,
Boston, Mass.
(*Reviewer.*)

Water Supply of Marseilles and Trials of Filtering and Sterilizing Apparatus.* The municipal authorities of Marseilles have been conducting experiments on the purification of the domestic water supply of the city. The supply is taken from the river Durance by a canal 58 miles long, completed in 1847. The water is charged with suspended matter, mud and lime.

The methods which have been tried are as follows:

1. Puech-Chabal—Multiple filtration with modifications, using submerged and non-submerged filters and sterilization by ultra-violet rays.
2. Siemens de Frise—Sulphate of Aluminum and Fe_2O_3 and sterilization by ozone.
3. Desrumaux—Sulphate of Aluminum.
4. Otto—Rapid filtration and sterilization by ozone.
5. Duyk.—Chloride of Lime with mechanical filtration.

The first reservoir of the system, about seven miles from the intake, is formed by a gorge with steep sides and an earth-work embankment along which the canal is carried. The reservoir holds 26,400,000 gallons. The water is diverted from the main canal by a weir and is carried by branch canals to a gallery leading to the bottom of the reservoir at a point farthest from the outlet at the end of the dam nearest to the city. The outlet canal is carried back along the whole length of the dam and the flow of water back into the canal is controlled by suitable sluices. Smaller canals are also along the sides of the reservoir for flushing purposes. Cleaning is carried out twice a year. The annual amount of suspended matter amounts to about 156,960 cu. yds. Near Roquefavour are two large decanting reservoirs. A third reservoir at Saint Marthe, a few miles from Marseilles is used as a reserve. The sand filters at Longchamps were abandoned in 1863, too much dependence having been placed in them, inasmuch as the amount of suspended matter is enormous. Even after triple decantion, these filters were called upon to deal with over 90,000 yds. of suspended matter annually. The large reservoir at Realtort, built in 1869, covers 185 acres and holds 937 million gallons.

A reservoir with special reference to flushing was constructed at St. Christophrè. The whole floor of the reservoir has been paved, forming

* W. Clemence, Engineering **91**, 106–8, 139-42.

channels all directing to a central collecting canal. The reservoir is entirely surrounded by a canal by means of which the reservoir is emptied. It can be completely washed out. The cost of the canals and storage reservoirs already exceeds $10,000,000. Tables comparing Marseilles with Hamburg, Bremen and Antwerp, giving the death rate from typhoid, are attached. The latter cities are all supplied from polluted rivers. They all use slow sand filtration, while Marseilles has used the decantation method. During the past ten years 2270 deaths from typhoid have occurred in Marseilles against 386 in Hamburg. It is also interesting to note that Hamburg uses the Elbe, Bremen the Weser, and Antwerp the Nethe river waters, all three streams being extremely polluted and not to be compared in purity with the Durance water.

In 1900 the multiple filtration known as the Puech-Chabal system was tried with a view of comparing it with other methods of treatment. Filters were constructed capable of handling 132,000 gallons in 24 hours, the whole of which passed through three series of gravel filters, followed by a coarse-sand pre-filter. Cascades are introduced in each successive filtration to increase the amount of dissolved oxygen in the water.

A comparison of the bacteriological results obtained by the submerged and non-submerged filters showed decided advantages in favor of the former. Sterilization by means of ultra-violet rays was then tried. The Cooper Hewitt lamp, with quartz tubes instead of glass was used for this purpose. The water was in every case practically sterile. The column of water which flowed under the lamp was 12 inches deep. The lamp drawing 3 amp. at 220 volts was placed horizontally and directly over the water. Experiments showed that the lamp should, if possible, be placed beneath the water, although various difficulties follow the submerging of the lamp. The consumption of current amounts to 26 watt hrs. per cu. m. of water.

Ozone Treatment (Siemens-de Frise System). Used in connection with mechanical filtration. The water is subjected to forced decantation and aluminum sulphate is added previous to decantation. Ozone is supplied by two Siemens-de Frise ozonisers, each group in batteries of eight and enclosed in an iron box with one side of plate glass, forming a water circulating tank. The water has a slight greenish color and on issuing from the apparatus has a decided odor and taste which are said to disappear entirely on storage in a service reservoir. The actual amount of current consumed in the preparation of ozone has not yet been ascertained.

Ozone Treatment (Otto System). Roughing filters made of fine sand are first employed before ozonizing. The ozonizers consist of a series

of glass plates in pairs so that there is a space of about 1 mm. between them. On the outside of the plates, flat metallic chambers are fitted and cooling is effected by circulation of water within these metal chambers. The current is transformed to 12,000 volts for the higher potential.

The sterilization apparatus consists of a tank of ferro-concrete on the top of which the inlet pipes for the clarified water are placed and connected with two injectors in which ozonized air is mixed with the water. Arrangement is made for recovering the excess of ozone. After ozonizing the water is cascaded. The water has an entirely different odor and taste before and after cascading.

Mechanical Filtration. The mechanical filtration plant tested was of the Desrumaux type, provided with an apparatus for mixing the sulphate of aluminum with the raw water. The sulphate is added in a 3 per cent. solution by a regulating apparatus, using 5 gms. per cu. m. of water. The water is then passed through a decantation tower and is clarified before passing through the filters. The filtering materials used consist of crushed quartz resting on a perforated iron bottom. The filtering layer required cleaning every few hours. The operation is performed by reversing the flow and stirring the bed with mechanically worked rakes.

Chlorine Process. The Duyk apparatus for sterilization by chloride of lime consists of a decantation tower carrying a tank for mixing the sulphate of aluminum. After the clarified water has passed to the top of the tank the chloride of lime is added by means of an apparatus which delivers 100 c. c. of a 2 per cent. solution of chloride of lime per cu. m. of water.

Tables have been compiled from the various bacteriological reports, giving results of each system. A comparison of these results shows that in multiple filtration without the use of chemicals, the effluent from the rough sand pre-filters has reached a higher bacterial standard than from the high speed mechanical filters, using chemicals as a coagulant. Experiments with the submerged filters and the sprinkler filters show the advantages of the former.

With regard to sterilization, the ozone and the ultra-violet rays are remarkable, reducing the bacteriological count over 99 per cent., completely removing *B. coli.* It remains to be proven yet whether the ozone can be so entirely eliminated as to remove the taste and odor and also whether the corrosive effect of the ozone on the pipes can be completely overcome. It must be remembered, however, that complete sterilization can only be obtained when the water has been previously rendered clear and the number of bacteria largely reduced by efficient filtration.

Clarification must also precede sterilization by chloride of lime, from results achieved. It would seem that there are now reliable methods of

sterilization which may be applied to ordinary filtration works, the output of which may be very largely augmented by increasing the rate of filtration and relying on efficient sterilization apparatus to deal with the bacteria which may have passed the filter owing to the increased speed. In an actual test, speed was increased four times and the effluent was then subjected to the ultra-violet rays. Results at first showed a somewhat high figure for aerobic bacteria after sand filtration, but the number rapidly decreased. Tests after the application of ultra-violet rays showed that *B. coli* was absent.

GEO. B. FRANKFORTER.

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SPECIAL ARTICLE

SOME EXPERIMENTS UPON THE REMOVAL OF OYSTERS FROM POLLUTED TO UNPOLLUTED WATERS.

By EARLE B. PHELPS.
From the Public Health and Research Laboratories, New York.

The activities of the Federal Department of Agriculture and of the various state authorities in connection with the oyster industry and with particular reference to the sale of oysters from polluted sources, has, within the past year, led to the official condemnation of large areas of oyster grounds upon which there exist at present oyster layings of enormous value. This official condemnation takes the form of a refusal to grant licenses for the further use of these condemned grounds for the raising of oysters. The owner of these oysters and the lessee of the grounds in such cases finds himself obliged either to abandon his property wholly or to attempt the removal of the oysters themselves to waters of a purer character, with the expectation that after a sufficient time has elapsed these oysters will have cleansed themselves and become sufficiently freed from evidence of pollution to be once more marketable. It therefore becomes a matter of considerable importance to determine the minimum length of

time required for this self-purification to take place. From a sanitary standpoint, this time must be adequate to insure a thorough and satisfactory removal of all traces of polluted matter. From a commercial and economic standpoint it is desirable for two reasons to make this time as short as possible. In the first place, oyster beds that, owing to their remoteness from sources of pollution, are sufficiently good for the re-laying of these polluted oysters, are difficult to find, and in the case of any particular individual are apt to be extremely limited in area, so that if several re-layings were possible upon the same bed in the course of one season, the productiveness of these purer beds is greatly enhanced. A second and more vital advantage in a short period of cleansing, lies in the habits of the oyster itself. It is a well-known fact among oyster producers that oysters fattened in the fresher waters, which are those most subject to pollution, rapidly lose weight and yield less meats to the bushel after having been so transplanted. This process of deterioration, from a practical oysterman's point of view, takes place throughout the course of several weeks, so that if the process of cleansing can be reduced to a minimum period of storage, the net yield of shucked oysters will be increased thereby.

In order to determine, if possible, the minimum time that must elapse after oysters are removed from sources that are seriously polluted to clean waters, before they are freed from all evidences of pollution and therefore safe for use, certain experiments were undertaken by the writer in co-operation with an oyster producer of Providence. The oysters that were employed for this purpose were from beds in the Providence River which had been condemned by the Rhode Island Shell Fish Commission. One of these beds was located near Bullock's Point and the other off Conimicut Point. Samples of about fifteen bushels from each of these sources were put down just inside the mouth of the Kickemuit River. A third similar sample from Bullock's Point was laid in West Bay to the Southwest of Prudence Island. The locations of these experimental batches were carefully noted, and the work of transplanting and the operation of sampling from time to time were all done under the immediate supervision of the writer or his technical assistant.

In order to make plain the results of this experiment, it will be necessary to outline briefly our methods of testing oysters and of measuring the degree of pollution to which they have been subject. For this purpose ten oysters are removed from the bottom and with a minimum of handling are placed at once in clean containers, iced, and sent to the laboratory. They are there thoroughly cleaned and opened by means of sterilized instruments. The oyster liquor obtained from within the shell is then collected in a sterile bottle and immediately examined bacteriologically.

The presence of sewage or other pollution is indicated by the presence of characteristic sewage organism, *B. coli*, in this liquor. The degree of pollution is indicated by the relative numbers of this organism found in a definite volume. The entire ten oysters are examined in this way, and the average number of *B. coli* per cubic centimeter is determined. This is the procedure recommended by the Committee on Standard Methods of Oyster Testing of the Laboratory Section, A. P. H. A., the method of calculation of the averages being that of the writer.*

To illustrate further the use of this method, it may be stated that oysters showing a factor of contamination of less than five *B. coli* per cubic centimeter are passed unconditionally by the Rhode Island Shell Fish Commission. The Commission also passes conditionally beds upon which the factor of pollution ranges between five and ten, and condemns or refuses to certify beds upon which this pollution factor is shown to be over ten.

The beds from which these oysters were taken were without doubt too seriously polluted to justify their use. An inspection of the Providence River, which is seriously polluted by the sewage of the city of Providence and elsewhere, would, be sufficient, even in the absence of any further information to condemn these beds. The pollution factor upon the Bullock's Point bed was found upon examination to be 22.8, and upon the Conimicut Point beds to be 71.2, indicating in both cases conditions of pollution too serious to justify further use of these beds. The two experimental batches previously mentioned were collected from these sources on October 21st, and laid in the Kickemuit River on the same day. Four days later, October 25th, the first samples were taken from both these batches. The number of *B. coli* found in the batch from Bullock's Point on this day was less than one per cubic centimeter, and in the batch from Conimicut 2.8, showing that in both cases these oysters had been sufficiently cleansed within four days to warrant their being marketed. On October 31st, ten days after their transplanting, these same two batches were again examined and found to contain 0.6 and 0.4 *B. coli* per cubic centimeter, respectively. These results compare favorably with the best that it is possible to obtain in the waters of Narragansett Bay. This was ten days after the transplanting of the oysters. It was obvious from these experiments that surely within four days, and possibly within a shorter period of time, a healthy oyster transplanted from polluted to clean waters will rid itself of the evidences of pollution, and we may justly argue from this that the sewage material which is always associated with *B. coli*, and of which the latter is taken as an index, have also been eliminated.

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*Phelps, E B. A Method of Calculating the Numbers of *B. coli* present in a water from the results of Dilution Tests. American Journal of Public Hygiene. VIII., (1908).

It was of further interest, however, to determine if within this period of four days a satisfactory result could be obtained. For this purpose a third batch of oysters was collected off Bullock's Point, and these, owing to some doubt that had arisen in the meantime as to the purity of the Kickemuit River, were re-layed in the West Bay. This was done on October 29th. On October 31st, a sample of oysters collected from this batch showed an average content of *B. coli* of 0.4 per cubic centimeter. On November 2nd, two weeks after the laying of the first two batches in the Kickemuit, they were again examined and showed an average *B. Coli* of 1 and of 0.4, respectively. They had evidently reached the limit of purity possible in these waters. Further examination of the West Bay batch was not made by reason of the fact that such very rapid improvement was shown within two days, that there could be no reasonable doubt as to the efficacy of very short periods of storage in clean water.

Further experiments are now under way with larger batches, tending to show the effect upon the marketable qualities of the oysters as regards the net yield of meats, but the importance of these experimental observations seems sufficiently great to justify their early publication in order that attention may be directed to this desirable mode of procedure in case of the condemnation of valuable oyster layings.

THE PREVENTION OF BLINDNESS.

By SAMUEL E. ELIOT,

Secretary, Russell Sage Foundation Committee on the Prevention of Blindness.

In any complete scheme of public health, the conservation of eyesight has a place. For, if general physical health comes first on the list of factors making for happiness, and mental health comes second, eyesight should perhaps be accorded third place.

Consider for a moment the value of human eyesight, and first its value to the individual who enjoys it. It can scarcely be calculated in quantitative terms—in dollars and cents—though economists will list for you the compensations due for loss of eyesight in various grades of employment. Nor can the value of eyesight be altogether appreciated in qualitative terms of a positive character, such as that "sight is the most important special sense" a thing we know so well that it means absolutely nothing to us. About the only way, in fact, to realize the value of sight is to really try to imagine yourself to be blind. Sight is like many other things in life—you realize their value only when you no longer have them.

We have heard most able and informing papers on the facts of mental defects and diseases, and the methods of their amelioration and cure. It is most fitting that the theme "Prevention of Blindness" should be ranged alongside of these themes, for is not blindness a most distinct and radical form of mental abnormality? Is it a normal brain in which a whole network of brain cells and tracts bearing the accumulated impressions and associations of years, are permanently cut off from fresh stimuli and the possibility of fresh associational development thus entirely lost?

There are those who maintain that the average blind person is normal, but it is glossing matters to say this. Those who say that a blind person is normal are those for whom the vague and childish term "crazy" is synonymous with abnormal. Of course a blind person is not by reason of his blindness insane; but he is abnormal, irretrievably and distressingly abnormal, despite every mitigation or alleviation that all the cleverness and kindness of his seeing helpers may contrive and administer. Thus it is in terms of loss that we can best grasp the positive value of sight to the individual.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 1910.

And the value of eyesight to society is likewise realized only in terms of loss when an actual case of blindness occurs. It means little or nothing to say that 99 out of a hundred callings or trades are absolutely dependent upon the good eyesight of their employees, but it does mean something to say that 99 out of 100 men, if blinded in mid-life are no longer of any use in their original callings. If a man is blinded, it simply means, in the vast majority of cases, that that man loses his job and has to work out a totally new relation to his community. As a general rule, the value of that man after his misfortune is only a bare fraction of what it was formerly; and although valiant efforts are made by many workers for the blind, to break up the line of economic distinction between the blind and the sighted, by striving to make the blind industrially or professionally self-supporting—nevertheless there always remains, and doubtless will remain a large number who are rendered permanently dependent to a greater or less degree, if blinded in mid-life. Indeed, even those who do become entirely self-supporting usually do so after passing through a longer or shorter period of dependence, during which they have received their instruction for independent living; so that at the very best, independence of the blind is a qualified thing.

The Germans in an experience of almost a century in the education and training of the blind, have come to the conclusion that the blind are a partially dependent class.

Thus far, we have considered that class of blind who become blind in mid-life. The individual and social significance of sight may, for those imaginatively inclined, be conceived even more vividly by a consideration of the case of those born blind. The person blinded from birth has cost as a child so much more to educate than a seeing child, and is inherently so handicapped by the absolute absence of any development in the cortical centers of sight — a matter of primary importance in the development of the whole man—that it is decidedly the exception if a rounded and well-poised personality, or an economically independent adult can result.

Thus again we see that the social value of eyesight is also best realized by a consideration of what we have lost after we have lost it.

However, the great value of eyesight from either standpoint, constitutes no special reason for the inauguration of a social movement for the prevention of blindness. The same line of argument also justifies the efforts of oculists and ophthalmologists, who, on the whole, adequately occupy the central field of relief and cure of eye distress. Some further argument is needed to justify a social movement, and that argument is provided by an analysis and study of the several outstanding causes of blindness and eye disablement. For the fact is thus adduced that several of these causes are

amenable to social control. That is, they can be approached from the side of sociological investigation and can be measurably dealt with by the education of the public and by the passage of social legislation. These are the facts that warrant the prevention of blindness movement, and give it a footing alongside the activities of the medical profession. It is thus required of the lay worker in this movement that he, as well as the oculist, appreciate the vast value of eyesight.

Near the head of the list of causes of blindness and eye disablement, stands "Babies' sore eyes; or Ophthalmia Neonatorum." In 1882, Crede, of Leipsic, discovered that a 2% solution of nitrate of silver* dropped into the eye of the infant soon after birth effectually destroyed all possibility of infection due to the gonococcus or other germ, with no harm to the eye of the child. One would suppose that the discovery of this prophylactic would have been followed by an instant and hearty adoption of its use by all gynecologists and family physicians. But in this country the fact that the practice of the midwife is so scantily regulated, operates strongly against this prophylaxis attaining the degree of usefulness which is its due. Investigations have shown that large sections of the medical profession itself are obdurately ignorant and apathetic about the use of the prophylactic. It can thus be clearly seen that ophthalmia neonatorum is a cause of blindness which is thoroughly amenable to social control. That it would pay to make an effort to obtain this control became unquestioned when it was found by investigation that anywhere from 25% to 35% of the cases of blindness received at ten schools for the blind in this country were due to ophthalmia neonatorum. Of course the majority of blindness occurs after school age. Consequently perhaps 10 per cent. of all blindness, or between 7,000 and 10,000 cases in this country are due to the neglect to have the prophylactic applied to the children's eyes at birth in time to save them.

The number of cases of unilateral blindness is vastly greater and represents a great handicap on the part of the sufferer. The total number of those suffering from one form or another of acute eye distress or disablement of vision, other than that of unilateral blindness, has never been fully studied, and until methods of recording are improved, probably never will be. The clinics of eye and ear hospitals and the practice of private physicians, indicate that the number is vastly large.

We thus see how there was thrust upon the shoulders of far-sighted physicians and responsible laity, the following obvious and specific pieces of business, namely: first, to investigate the extent to which the prophylactic is used, as well as to study other causes of blindness; second, to tell the

*Most physicians now employ 1% solution nitrate of silver.

general public about the dangers of gonococcic infection, as well as innocent infections at birth; and further to tell people to demand of their physician, or whoever else attends the birth, either the use of the prophylactic or specific reasons why it is not used in specific cases; third, to get legislation passed which would conduce to the wider and more intelligent use of the prophylactic.

In New York in 1908 a co-operative committee of physicians and social workers was organized for precisely the foregoing purposes. That committee is known as the Committee for the Prevention of Blindness, of the New York Association for the Blind. Dr. F. Park Lewis, of Buffalo, has from the beginning been very active in furthering the purpose of this organization; and Miss Louisa Lee Schuyler, of New York City, the present Chairman of the Committee, has given much time and attention to the movement. Miss Carolyn Van Blarcom, a graduate nurse of Lotus Hospital, is the present secretary.

This New York committee has achieved much along the lines of education, publicity, and legislation. It has published and circulates widely six bulletins relating to the prevention of blindness. It has a number of photographic and lantern slide exhibits which have been used widely not only in New York State, but far beyond its confines. A lecture tour throughout some of the towns of the state, and addresses before Women's Clubs and talks to Mothers' Clubs at settlements, articles in general and special magazines, have been other avenues of usefulness which have been employed. With the aid of State Commissioner Porter, some excellent pieces of legislation have been obtained, among which may be noted a law providing for the free distribution of the prophylactic through the Health Boards, for which the State pays $3,000.

Those who are interested in the details of the growth of the movement in other states, I would refer to the bulletin published by the Committee on the Prevention of Blindness of the Russell Sage Foundation. This bulletin is reviewed in the last August issue of the Survey, and in a foot note to that review, appears my name and address. I shall be only too glad to send this bulletin to anyone desiring it. It gives a brief and clear outline of the work from the very beginning up to the middle of May of this year.

At that time, the Committee of the Russell Sage Foundation appointed me as a National Secretary to further the work of prevention of blindness in other states, and I have accordingly aided in the organization of three State Associations for the Prevention of Blindness which are already launching on careers of useful activity. In Kentucky, Missouri, and Arkansas, where these organizations have been formed, the New

York plan has been generally followed; namely, close co-operation of medical men and laity in a program of investigation, education, and legislation.

Practically all of the work which I have outlined or referred to above, has been concerned with one outstanding cause of blindness,—namely, Babies' Sore Eyes. This limitation of the objects of the work has been a conscious and intentional one. It has been felt that it would be best, in the long run, to demonstrate that prevention of blindness, as a social movement, is a good thing, by doing one thing well. But there are other causes of blindness amenable to social control, perhaps of equal, possibly of greater importance than ophthalmia neonatorum. I shall mention here only two of these—namely, trachoma and industrial accidents. Recent developments tend to indicate that the time may be ripe for the prevention of blindness movement to extend its efforts to these two causes of blindness.

Take trachoma. When we began to organize in Kentucky, we found that the mountains in the eastern part of the state were full of it. One of the best oculists in Lexington, who has held a clinic for three days in one of those poor mountain counties, reported that he saw over 70 cases of trachoma during that time, and the reports of laymen tend to corroborate this testimony. As a result of our activity, Dr. MacCormack and his health board have granted to the Prevention of Blindness Association an appropriation to pay for the investigation of trachoma in Clay County, Kentucky. Dr. Ray, one of Louisville's finest oculists, has trained the young physicians for the special purpose of making this survey; they will be able to make as good a differential diagnosis for trachoma as can be made anywhere.

In Arkansas it seems that over 50% of the students in the School for the Blind are victims of trachoma. Most of these come from the northwestern part of that state.

In southern Missouri a similar condition probably obtains. In southern Illinois there is a nest of trachoma. In regions of Ohio, inhabited by Slavs and Poles, there are quantities of cases of trachoma. In Texas and California and the other states that impinge upon Mexico, there are reports of trachoma. And since returning to New York, I have come into communication with Dr. Franklin of Pennsylvania, who has for years been interested in devising means for the control of trachoma in that state. He is exceedingly alive as to the prevalence of trachoma in this country.

An average of more than two-thirds of the immigrants rejected from this country, are rejected because they have trachoma. It is pertinent to ask—why do we examine every prospective inhabitant of this

country for trachoma, and allow to go unexamined and uncontrolled, hotbeds, literally hotbeds of trachoma, in numerous and various quarters of the Union itself. Until attention is given to sources of infection within the country, the examination of every person entering this country is practically a farce. The effects of trachoma are not so swiftly or so surely suffered as are the effects of gonococcic poisoning. The cure is a more tedious and more costly process than is the dramatic and almost instantaneous cure of ophthalmia neonatorum with two cents worth of prophylactic. Babies appeal more directly to sympathy than do children or adults; but do any of these considerations deliver the public for a moment from responsibility for the suppression of trachoma?

Again take industrial accidents to the eyes—a very large percentage of blindness could be prevented by the passage of laws requiring the installation of safety appliances and the wearing of glasses by operatives in trades dangerous to the eyesight. For instance, in visiting the breweries yesterday, it was noticeable that the girls and boys who handled the bottles as they came from the sterilizing process, in some cases, wore glasses for protection. I asked the foreman about this. He told me that the pressure in these bottles is anywhere from 10 to 25 pounds; that the glasses sometimes have flaws; that the handling of them jars them; and that as a result bottles explode daily, sending bits of glass everywhere about. Sometime ago, two cases of blindness resulted inside of one month. Consequently those glasses have been provided by the employers; but do the girls wear them?—that is another story. They think that the glasses interfere with their good looks! This foreman has recently had to discharge twelve girls for not wearing the glasses. Young people are careless and willing to take risks—but how about the state caring for the education of the blinded persons? How about the forty other breweries in the state where no uniform procedure in this matter is observed, and how about the soda bottling factories where the pressure in the bottles is from 40 to 50 pounds? It certainly looks as though the law should do its proverbial stepping in, and should require the wearing of glasses in cases like these. I have little doubt that this condition is representative of many other industries.

There is another evidence that at least trachoma and industrial accidents to the eyes may come within the province of our social movement; for we have always followed the suggestions of the medical profession, even if we have to tell the medical profession to suggest things to us. At the meeting of the American Medical Association the Committee on Ophthalmia Neonatorum, of which I shall speak at greater length presently, was expanded into the Committee on the Prevention of

Blindness, with committeemen appointed to take charge, among other causes of blindness, of trachoma and industrial accidents. Thus not only the nature of these causes of blindness, but the action of the medical profession also, give promise that the prevention of blindness movement will definitely expand its sphere of usefulness.

The general topic for dicussion, I have not yet touched upon. I now wish to speak briefly regarding the inter-relation that exists between the Prevention of Blindness on the one hand, and two of the National Associations working in the interest of health, on the other—namely, the American Medical Association, and the National Movement for Sex Hygiene.

Our relations with the American Medical Association have been clearly defined from the very beginning of our movement. The Committee on Ophthalmia Neonatorum of the American Medical Association is, indeed, father to the national work now undertaken by the Russell Sage Foundation. For the past five years the Committee on Ophthalmia Neonatorum of the Medical Association, under the able leadership of Dr. F. Park Lewis, has been doing a great work, not only in educating and quickening the medical profession as to the importance of the issue, which ophthalmia neonatorum presents, but also, through its state committees in every state in the Union, doing much to arouse the general public, and to instigate legislation.

Considerable investigation and statistical work has also been done by means of these committees throughout the country. The program of the Committee on Ophthalmia Neonatorum is indeed a model one, and much of it has been successfully carried out; but the machine-like character of the organization, its wide distribution, the difficulty of its getting together, have necessarily caused the results of its work to be uneven in amount and quality. In short, Dr. Lewis' experiment of the efficient help which social workers gave to the movement in both New York and Massachusetts, as well as in other states, led him to advocate the joining of the medical profession and social workers in a broad national movement.

In any state where we organize, the State Committee on Ophthalmia Neonatorum, consisting of a gynecologist, a sanitarian, and an ophthalmologist furnishes the nucleus of the local movement.

In short, everywhere and always, we take our orders from the medical profession; without its approval, we do not move.

Finally, a word as to our relations with the sex hygiene movement. So far as the prevention of blindness deals with infection by the gonococcus, it overlaps the work of the sex hygiene movement. It would perhaps be truer to say that it attacks the same problem at a slightly different level

and from a slightly different angle, than to say merely that it overlaps it; for, from the point of view of causes, so far as the prevention of blindness movement deals with infection of the eyes by the gonococcus, prevention of blindness is a misnomer. It should rather be called cure of one of the more immediate and distressing effects of gonococcic poisoning. But in addition to a program of practical curative work, which this part of the prevention of blindness movement really undertakes, it can and does add its voice to the campaign of education in fundamental moral prevention of social diseases, which is the distinctive mission of the sex hygiene movement.

Though the educational appeal made by the prevention of blindness movement must enter the public mind and conscience through a comparatively humble wicket gate, perhaps almost as much knowledge and stirring of conscience may enter in this way as through the main gateway, which is so heavily guarded by the prejudices and traditions of centuries.

So far, then, as our relations with societies of sex hygiene go, it is apparent that our work is different from theirs, inasmuch as it emphasizes relief of symptoms, rather than eradication of fundamental causes. But it is the same as theirs in so far as both indirectly and directly its campaign offers a glorious opportunity to arouse the public and educate it mentally and morally on one of the most important issues facing it in this or any age, namely, sex hygiene.

THE AMERICAN CIVIC ASSOCIATION AND ITS RELATION TO PUBLIC HEALTH.

By RICHARD B. WATROUS, Secretary.

The objects of the American Civic Association are stated to be: "The cultivation of higher ideals of civic life and beauty in America, the promotion of city, town, and neighborhood improvement, the preservation and development of landscape, and the advancement of outdoor art."

Under that brief statement, the Association for the past seven years has been seriously engaged in a variety of activities, which may be briefly stated as follows:

It has aimed to make living conditions clean, healthful, attractive; to extend the making of public parks; to promote the opening of gardens and playgrounds for children and recreation centers for adults; to abate public nuisances—including billboards, objectionable signs, needless noises, unnecessary poles and wires, unpleasant and wasteful smoking factory chimneys; to make the buildings and the surroundings of railway stations, schools, and factories attractive; to protect existing trees and to encourage intelligent tree planting; to preserve great scenic wonders (such as Niagara Falls, the White Mountains and the Hetch-Hetchy Valley) from commercial spoliation.

During the present year the American Civic Association has been very active in conducting a national crusade for the extermination of the house fly. It is largely due, I presume, to that crusade, that we are asked to be represented at this symposium for the consideration of the relation our several societies may bear to the general subject of safeguarding the public health.

Referring to our original statement of purposes, it may seem a departure from those purposes to be so actively identified in the campaign to "swat" the dangerous little typhoid fly. One, at first thought, does not associate the making of parks and boulevards with the killing of flies; but a second consideration will make it very clear that we are acting entirely within our province in this new crusade, for if it involves any one effort more than another, it is the thorough cleaning up of properties in the vicinity of the home, the school, the factory, and the store, in both the largely populated centers and in the rural districts.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

For years we have been urging the beautifying of the back-yards and front-yards for the sake of BEAUTY alone. The fight against the fly gives us a more serious argument for urging such effort. As a result of research by scientific bodies and organizations such as the American Public Health Association, it has been demonstrated beyond successful refutation that the fly is a menace to public health; that what is known as the *musca domestica* is really the very dangerous TYPHOID FLY, and in our propaganda he is being so designated.

There can be no doubt that his pernicious activities, which begin with his birth in the filth of a manure pile, and continue in his course over decayed animals, decaying fruit and vegetables, and into the homes, to spread the germs of disease on our food, are responsible for the death of hundreds of thousands of men, women, and children annually. There is no more occasion to demonstrate to the average thinking man the importance of exterminating the fly, than to convince him that it is wise to carry life insurance.

Crusades against the house fly are not a development of this year, 1910, for as long as ten years ago advanced thinkers commenced the fight on the fly, and various state and city health boards have been conducting such a fight with more or less vigor for the past few years. At our Convention at Pittsburgh in 1908 the fly was made the subject of a special paper by Mr. Daniel D. Jackson. It remained, however, for the American Civic Association to bring together, this year, these several and separated campaigns into one national crusade, the principal purpose of which should be the education of the masses of the people to the dangers attendant upon the unrestricted liberty of the fly, and to show them ways and means by which its numbers might be very greatly reduced. The crusade is a popular one. Everyone wants to join it, if only to get rid of a nuisance. We are showing the fly in its true and dangerous light.

Widespread publicity secured from our general offices in Washington, and made doubly valuable by the use of magazines, as well as by newspapers, has presented the fly in its hideousness to more people this year than ever before.

Under the direction of the Chairman of our Fly-Fighting Committee, Mr. Edward Hatch, Jr., of New York City, who last year was Chairman of the Fly Committee of the Merchants' Association of New York City, a remarkable series of photographs was taken in England, illustrating in minutest detail the habits of the fly in its breeding, showing it enlarged to the size of a Plymouth Rock hen as it burrows in the manure pile for a nesting place, showing the development of the eggs through the larvae and pupae states into the adult fly.

As a second chapter, some of the offensive habits of the fly are most effectually displayed, as, for instance, his course over the remains of decaying fish and from there to the loaf sugar on our dinner table, again back to a cuspidor licking up the slime on its edges, with a quick flight thence to the nipple of a baby's nursing bottle, which in the next picture very naturally finds its way into the mouth of the nursing baby.

Those films have been sent out through the five and ten cent theatres of America, reaching just the people most desired to be reached and without doubt sending them to their homes determined at least to get rid of the flies that may be found in their own homes, and in many cases to become ardent and enthusiastic co-workers in the general campaign for the complete extermination of the fly. Reports received from many film distributors show that the fly pictures have been very popular. In many cities they have been presented under the auspices of the local civic associations.

As a natural feature of our crusade we have issued bulletins pointing out the dangers of the fly and suggesting methods for its extermination. We have devoted practically all of our efforts toward impressing upon people the importance of doing away with the breeding places of the fly. So far as possible we have avoided any extended suggestions as to the elimination of the fly when once it gets into the house, except as we have urged that houses should be screened to prevent its entrance, and have suggested some preparations or mixtures which might be safely applied for its killing; of course, carefully avoiding the recommendation of any proprietary articles. I believe the strong right arm with a newspaper to "swat" the fly is the best method, unless they are too many in number.

Formaldehyde has been recommended by no less an authority than the London Lancet. This summer, however, has brought several reports that it is ineffective. For a wholesale slaughter of flies inside the house, Dr. L. O. Howard, Chief of the Bureau of Entomology, believes that Pyrethrum, prepared in small cones and burnt, is about the most effective agency. But these are details concerning which most of this audience are far better informed than I, or possibly other members of the Fly-Fighting Committee of the American Civic Association.

Let me allude briefly to other activities which bring us into close harmony with the general movement for the safeguarding of health. A few years ago, for very much the same reason that we assumed our responsibility in connection with the fly, we aided a persistent educational campaign for the extinction of the mosquito, and issued at that time valuable pamphlets which have been recognized as authorities by individuals and communities.

Those conversant with the mosquito subject know that wonders have been accomplished, notably on Long Island, in Florida, and in Cuba. It has been conclusively demonstrated that the mosquito can be eliminated; we believe the same results may be accomplished with the fly.

Another campaign which has to do with the conservation of human life has been our active participation in the movement for a safe and sane Fourth of July. Always bearing in mind the importance of continuing as a great American institution, an enthusiastic, happy observance of the birthday of the Nation, we urged that the use of explosives and fireworks be absolutely prohibited in large cities. We have urged upon common councils and other legislative bodies the importance of passing stringent ordinances on the subject. The results of a continuous demand for a safe and sane Fourth of July are beginning to be apparent in the decreased number of accidents and fatalities incident to the use of explosives. In our work for a safe and sane Fourth of July we have urged that civic bodies take upon themselves the preparation of programs of a different character which will give pleasure to the grown-ups as well as to the children.

We urge the abatement of two other nuisances, and in connection with each of them we are, again, working for healthy living conditions. In our arguments against the billboard we claim that it is not only a menace to civic art and good morals, but to good health. It does not require any extended arguments to make it clear that the billboard offers opportunities for the spread of disease because of the refuse that is permitted to accumulate behind it and the refuse that is a feature of the paste and waste paper torn from the billboard.

It is almost needless, also, to touch upon the importance to the public health of a wise solution of the smoke problem. It is a problem that has engaged the serious thought and consideration of medical societies for several years past. We regard the smoke problem as an economic one from the standpoint of the manufacturer and endeavor to impress upon him the fact that by permitting the emission of vast volumes of smoke from his factory chimneys he is practically burning up money; from the standpoint of public health he is contributing to conditions which are not favorable for the good health and happiness of the communities which permit large quantities of black smoke to issue from their industrial plants.

In closing, let me say that the American Civic Association welcomes any movement which proposes to bring into harmonious action these several movements for the public health. We believe that we have opened up avenues for efficient service which are very properly being

conducted by the American Civic Association and shall continue with all the vigor we have to put forth our best efforts for the achievement of these several reforms. We are glad to co-operate with other organizations in their efforts and to have them co-operate with us in ours.

Briefly summarized, we believe that the American Civic Association, the American Public Health Association, and other similar organizations stand for what is the best and most worthy of enthusiastic support in conservation—a conservation which need not involve any one class of men against another in dispute—the conservation of human life.

CHILD LABOR AND PUBLIC HEALTH.*

By EDWARD N. CLOPPER,
Ohio Valley Secretary, National Child Labor Committee.

The protection of children from premature or otherwise improper employment and the consequent promotion and safeguarding of the welfare of society, necessitate, first, a comprehensive and carefully drawn child labor law, and second, complete and impartial enforcement. Social workers are advocating the adoption by the states of the standard child labor law which is composed of the best provisions of the various statutes now in force in those states having the most advanced legislation on this subject. So we have a goal toward which to work in the first essential movement for child labor reform—a standard law, the provisions of which have already been proved necessary by the experience of several states. The second essential movement—the securing of the law's enforcement—is by far the more important and the more difficult step toward child labor reform.

The standard child labor law may be a thing of beauty as it reposes tranquilly on the pages of an admiring commonwealth's statute books, but it can never become a joy forever until it is completely and impartially enforced. The preservation of the health, and therefore the future efficiency, of working children depend in large measure upon strict enforcement. Referring to the physical effects of the abuse of children by premature labor in Italy, Mosso says: "The ruin which the exhaustion of fatigue brings about in man, appears clearly in the degeneration of our race in some parts of Italy. In the province of Caltanissetta, for example, in the four years from 1881 to 1884, out of 3,672 sulphur workers, youths of twenty years of age, who presented themselves for examination, only 203 were declared fit for military service." I quote this statement to show the fearful ravages entailed by a neglected form of child labor and to urge the necessity of better administration of the laws that we have now in this country relative to the employment of children. In the United States at the present day bad conditions still exist. The results of the investigation made by the Department of Commerce and Labor into the conditions surrounding working women and children have not yet been made public in their entirety, although it has been nearly four years since Congress authorized the study, but we learn that in the textile industry 5.2% of the employees in northern cotton mills are children under 16 years, while 20% in the

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept., 1910.

southern mills are children. The difference between the findings in the mills and in the homes concerning the ILLEGAL employment of children is worthy of special note: the study of age groups in the mills reveals .4% of the northern children working UNDER the legal age, while the homes reveal 4% or 10 times as many; in the South the mills show 1.64% and the homes the enormous proportion of 24.6% working under 12 years—of whom 8.2% are under 9 years. In the southern mills 52.4% of the children under 14 years can neither read nor write, as against 12.2% of those working illegally under this age in the North. Among children of 14 and 15 years, about 7% in the North are illiterate, in the South 35.5%. In two states mills were found regularly exceeding the legal limit of work hours. Eleven mills were found in various states "stealing time" by beginning before the hour scheduled in the morning and at noon. Seven mills REQUIRE overtime work, three of these from children as well as women. In North and South Carolina 32 mills employ 549 children from 11½ to 12 hours a NIGHT for five nights in the week. What will be the ruin wrought upon these children by "the exhaustion of fatigue?"

When we think of the conditions under which these children work, and the effect upon their health, it is disappointing to read the mild opinion of the Board of Health of a great textile manufacturing state, concerning bad conditions in cotton mills: "A weave-room with poor light, unnecessarily high temperature, some dust and an excess of moisture is not, from a sanitary point of view, a desirable room to work in. Neither is a spinning-room with considerable dust flying about, together with excessive heat and undue moisture." This is too much like saying that water is damp. It would be more in line with the real policy for safeguarding the health of employees, if in addition to insisting upon the improvement of such conditions, the board also declared that children under 16 years should not be employed at night nor more than 8 hours a day.

The principle that it is harmful both to the child and to society for children under the age of 16 years to be employed at any dangerous work, or at gainful occupation at night, or more than 8 hours a day, has been accepted in its entirety in this country by only five states and the District of Columbia. These six governments provide a total of 66 factory inspectors to enforce their child labor laws, and of this number, 53 are within the two states of Ohio and Illinois. Upon the efficiency of these officers very largely depends the well-being of the working children of these states. It is therefore cruel and short-sighted on the part of any state government not to provide an adequate force of inspectors who devote their time solely to inspection and prosecution.

Take for example the state of West Virginia, which ranks 36th in the Union with respect to child labor restriction; this state employs one lone man, the Commissioner of Labor, to enforce its laws on child labor, woman labor, sanitary condition of work-rooms and safety appliances, and also requires him to gather and compile the labor statistics and to conduct a free employment bureau. Is it surprising then that right in the city of Wheeling where this American "Pooh-Bah" has his office, the secretary of the Associated Charities found a 10-year-old boy who was working overtime in a glass factory? At the boy's home the mother said, "George is upstairs asleep, and he wanted me to call him, but I just made up my mind that he needs rest. Everybody thinks he is sick because he is thin and pale, but he isn't—he has just been working too hard!"

At intervals we have rudely thrust upon us the conviction that our officials in every state are not sufficient in number or are not careful in their administration of the child labor law; as when we read in the newspapers that a 12-year-old boy has, by his next friend, sued a company for damages because of the loss of an arm in their planing mill, or when we learn that a 13-year-old girl has been taken home from a paper-box factory in a fainting condition because of overwork.

Eternal vigilance is the price of protection for childhood everywhere—even in the states having the most advanced legislation, as in Ohio, where in a Cincinnati candy factory, the inspector, after having been told by the manager that no girls were employed, explored the establishment and found 21 girls working in the cellar where there was no ventilation and light from only two small windows.

The working children of West Virginia suffer further because of their one inspector's blind, illogical, and illegal policy of permitting certain children under the legal age to continue at work, on the ground that they are orphans and their mothers need their earnings. In a recent interview this official calmly stated that the law made an exception of them, which it does not. He declared further that there were only seven children under 14 years employed in the entire state. He probably had in mind a photograph of seven glass factory boys, all under 14 years and none of them orphans, which the Secretary of the State Child Labor Committee recently took in the hope that it might help to get some degree of enforcement of the law in the town where she lives.

The specter of the orphan and the widowed mother still looms large wherever child labor regulation is advocated. This is the attitude of almost all our opponents, and it is peculiarly unfortunate when it is assumed by the very person who is charged with enforcing the law. Both the legal and the illegal exemption of orphans from the protection of the law is

especially to be deplored. It places on children already handicapped, the additional burden of wage-earning at an age when, according to the very statute that grants the exemption or the official who tolerates it, children in more fortunate circumstances need protection. It is a false philanthropy and amounts to a denial of the birthright of childhood—protection, education, training, and play.

This mark of sympathy for the orphans by taking them into factories at an early age, reminds one of Lanigan's fable about the "Kind-Hearted She-Elephant": "An elephant while stamping through the Jungle one day quite unintentionally stepped upon a Mother Bird, crushing it to death. Hearing the cries of the Little Brood in the bushes near by she sought out the nest, and with a sympathetic sigh said: 'Poor little things! I've been a mother myself, I'll keep you warm,' and proceeded to sit upon the nest!"

The absence of adequate requirements for the proof of age of children about to go to work, is another misfortune in those states where either no proof at all is demanded or merely the parent's affidavit is accepted. In Indiana, if a relative swears that a child is 14 years of age or over, the child may legally enter any gainful occupation. This system places a premium upon perjury and often results in great injustice to the child. The employer is protected from prosecution by the parent's affidavit, but the child is exposed to exploitation by unscrupulous relatives. The following instance will serve to illustrate the possibilities for abuse that lurk in this well-meaning but impotent statute: John attended a public school in Cincinnati where he was examined by a medical inspector and found to be suffering with defective vision caused by syphilis, the prognosis being that he would be practically blind. The boy was taken out of the regular school and placed in the special school for blind children. Subsequently he went to Indiana to live with relatives, and last spring the principal of this special school told me that she understood he was employed in a brick-yard there, that she knew his eyesight was bad and was sure he could not be 14 years of age. I reported the case at once to the chief factory inspector of Indiana, who went to the town and found that the boy had been employed in the brick-yard, that he had an affidavit showing him to be 14 years of age, and that he had already quit work and left the town. In advising me of his findings, the inspector protested against "such misrepresentation" and declared that the trip had been "a wild-goose chase." I then started an inquiry to ascertain the exact date of this boy's birth and found that he was actually under 14 years, and therefore the affidavit with which he obtained employment was false.

This case not only illustrates the inadequate protection afforded by an unreliable method for the proof of age but also shows the need of medical examination of all applicants for the employment certificate, so as to prevent the further injury and waste consequent upon the exploitation and neglect of the unfit child.

Even after medical inspection of school children, many parents continue unmindful of the advice and warnings given concerning physical ailments or defects, and as soon as the age limit for compulsory attendance at school is reached, send their offspring to work. Out of the 3,285 children under 16 years of age in Cincinnati, who went to work last year for the first time in their lives, 70% were 14 years old—in other words, most of them had just passed the period during which attendance at school is required. If only proof of age and educational qualifications are demanded, it is inevitable that among the recruits annually supplied to the ranks of child workers there are many who are physically unfit for work.

The powers of the local boards of health should be enlarged, by making it a provision essential to every good child labor law that every child under 16 years who applies for an employment certificate must be examined by a physician of the board of health, and shall not receive the certificate unless he is found to be physically fit to go to work. Only one state in the Union—Massachusetts—makes such a requirement, and there the provision is brand new. On August 1, an act took effect in that state requiring the physicians appointed to inspect the children of the public schools to examine all pupils who are about to leave school to go to work, certifying in writing whether or not each child is in sufficiently sound health to enter upon employment for wages. Officers, before issuing an employment certificate to a child, must receive a satisfactory report of its physical condition from a physician. Hence only in Massachusetts can we be sure that a child suffering with tuberculosis, spinal curvature, or any abnormal condition, will not be permitted to become a breadwinner and expose both itself and society to the dangers of further physical deterioration and increased industrial inefficiency. And even in Massachusetts we can feel sure of this protection only when this law is enforced.

The standard child labor law which we are still struggling to have enacted by the legislatures of many states contains merely the first approach to such a requirement—namely, a permissive clause to the effect that the officer issuing the employment certificate MAY require a physician's certificate if IN HIS OPINION the child has not reached the normal development of a child of its age, and is not in sound health or is physically unable to perform the work which it intends to do. When it is considered that in communities where employment certificates are required, the issuing

officer is almost invariably a layman, unable to determine whether or not a child is physically below normal, and that the issuance of the certificates is simply an extra duty added to his other work and almost universally performed in a careless manner, we begin to appreciate the lack of adequate protection for the children who go to work in the few states that have passed the standard law, not to mention the many states that lag behind in the matter of restrictive legislation.

Another essential element in the proper administration of child labor laws is the granting to the State Board of Health the power to determine whether or not any particular trade or manufacturing process is sufficiently injurious to children to justify their exclusion from it. Such a law is now in effect in Massachusetts, where the State Board of Health has this power with respect to the work of minors under 18 years of age; after the Board has notified a manufacturer that his industry has been included among those deemed injurious to children under 18 he is subject to a fine of $200 if he persists in employing them. The extension of this power to state boards should be granted by every state in the Union.

The application of the advanced age limit to certain lines of work has just been found necessary for the protection of boys from the evil influences and bad physical effects that result from their employment in messenger service at night. New York bars boys under 21 years from engaging in this work, and Ohio fixes the limit at 18 years. These are both recent enactments. We have found that the night messenger service consists almost altogether of running errands in connection with the three great evils of gambling, drink, and prostitution, and that the boys engaged in it are not merely given the opportunity to become acquainted with the worst aspects of city life after dark, but by the very nature of their work are actually thrust into the vilest associations and forced into familiarity with the most degrading vices. Most of the night messengers are on familiar terms with the denizens of the local underworld and suffer with acquired venereal disease. If this work is to be done at all, place the age limit at 21 years, as in New York, and let it be done by men.

There is a very close connection between the problems of public health and child labor. The abolition of improper conditions of child labor in any form will greatly promote public health and well-being, but in order to proceed intelligently toward this desired end we must have full information regarding both the causes and the effects of present day conditions.

Dr. Henry B. Favill says, "If the state is to undertake the establishment of conditions designed to safeguard health, it is imperative that the foundation of accurate knowledge upon which to base radical and compre-

hensive legislation be laid. What we must strive for is knowledge, and to this end, the interested forces demand a National Bureau of Health, the most valuable function of which shall be the culture of intelligence upon defective health—the basis of crime, pauperism, and degeneracy, as well as that widespread inefficiency due to obvious disease."

Similarly we must have an authoritative source for the supply of accurate and UP-TO-DATE information concerning all matters pertaining to the welfare of children, such as infant mortality, the birth rate, physical degeneracy, orphanage, juvenile delinquency, desertion, and illegitimacy, child labor, dangerous occupations, accidents, and diseases of children of the industrial classes, and such other facts as have a bearing upon the health, efficiency, character, and training of children. To secure this source for reliable, prompt, and therefore useful information of this kind, social workers have been urging the establishment at Washington of a federal children's bureau so that the ills of the nation's children shall have the same attention from the government as the boll-weevil in cotton and the cholera in hogs.

THE AMERICAN MEDICAL ASSOCIATION AND ITS RELATION TO PUBLIC HEALTH WORK.

By WM. C. WOODWARD, M. D.,
Washington, D. C.

I shall ask you to regard me for a moment not as Secretary of this Association, but as a member of the Council on Health and Public Instruction of the American Medical Association. No meeting having to do with co-operation along public health lines, no meeting devoted to the conservation and promotion of public health would be complete unless the American Medical Association is represented. The members of the medical profession not only know, but the world itself knows that our profession has been devoting its energies from time immemorial not merely to the cure of disease but to the prevention of suffering, of injury, and of death. The American Medical Association, therefore, as a medical association, stands in the vanguard of preventive medicine. But it seeks no honors; it endeavors to displace no organizations; it stands at all times ready to co-operate with every organization and everybody that is working toward the improvement and conservation of public health. The association needs only to be shown the need and it will do its part. Although I carry no authority from the Association and no word of authority from the Council, but speak on my own responsibility, I think I may say without hesitation, that the Association will gladly take part in any investigation and study that may be decided upon looking towards the determination of a method by which the various organizations and the various public agencies of this country devoted to public health interests can best conserve their energy and accomplish with such resources as they have that which we are seeking, namely, the conservation and protection of the public health and that fulness of life that goes to make up human happiness.

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* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

† In the absence of Dr. C. H. Jones, Baltimore, Secretary of the Section on Preventive Medicine of the American Medical Association, who was to have spoken on this subject, Dr. William C. Woodward, of Washington, D. C., spoke as a member of the Council on Health and Public Instruction of the American Medical Association.

THE NATIONAL HOUSING ASSOCIATION AND ITS RELATION TO PUBLIC HEALTH.*

By LAWRENCE VEILLER,
Secretary, New York.

Before discussing the work of the National Housing Association, I want to pay tribute to the far-sighted vision of your President in inviting to this Convention the representatives of the different organizations who are working along somewhat cognate lines. It is something the American Public Health Association may be proud of in having taken the first step in correlating these different forces. It is indicative of a changed attitude that has come to the medical profession. I am sure all members of this Association are conscious of that change from the past type of practitioner, who used to throw a veil of mystery about the practice of medicine and used terms that the ordinary plain citizen could not understand. That veil has been withdrawn gradually. The old attitude of some practitioners was similar to the attitude of the foreman of a gang of section laborers working in a railroad cut whom I heard of the other day: Approached by a tall "green" Irishman who had climbed out of the ditch where he had been working and had started to take up a wheelbarrow, the foreman said to him, "What are you going to do with that wheelbarrow? Go down into the ditch where you belong; how dare you touch that wheelbarrow? What do you know about machinery?" Have not a good many members of the medical profession assumed that attitude in the past and asked the public what it knows about machinery,—meaning medicine and sanitary science? I, for one, rejoice that the veil of mystery has been lifted.

Dr. Farrand has said that his organization and all the organizations invited to participate in this meeting are helping to popularize sanitary knowledge. That is exactly our function.

The prevention of tuberculosis, the prevention of blindness, the abolition of child labor, the doing away with the fly nuisance,—all of these are important, but the importance of preventing bad housing conditions should not be overlooked.

Seriously, I am surprised to find how rapidly the belief is spreading throughout the United States that the matter of improving living environ-

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

ment is fundamental. It is not strange that it should be so. There is not very much use in taking people from a hospital, apparently restored to health, and sending them back to some slum, putting them into a dark room where they never see daylight, or letting them live over an open sewer; we all know that in two or three weeks we shall have them back in the hospital, in as bad a condition physically as they were before. The view that the improvement of home conditions and of all environment is fundamental, is not confined to the medical profession, but is spreading throughout the country.

The National Housing Association is a young organization, a group of public spirited citizens supported by voluntary contributions, seeking to accomplish certain definite reforms. It was organized less than a year ago, but some of its members have been working at housing reform for many years. It is evident that this closely touches not only the work of this Association, but more particularly the work of its individual members—the work of those of our members who are local health officers and members of boards of health.

The housing problem is a social one; it is an architectural one; and it is a moral one; but chiefly, and nearly always, it is a sanitary one. It is a great health problem to be solved along hygienic lines rather than architectural or moral lines. The problem, briefly stated, is to secure in the habitations of all classes of people, especially the poorer members of society, proper light and ventilation, adequate sanitation, and general cleanliness; to do away with nuisances, with alleys, and to solve the great and perplexing problems of the outdoor privy.

It may be of interest to the members of this Association to know how the National Housing Association does its work. We are a national body, not a local one. We go to localities, therefore, upon the invitation of those localities. We never thrust ourselves in. We do not go there to teach them how they ought to do their work, but we go there to advise and counsel with them when they wish it. We seek always to build up a strong local organization, either as a branch of our national organization or affiliated with it; we do not necessarily seek to form a separate and new local body. If we find a group of citizens affiliated with the Chamber of Commerce we seek to make that movement permanent, to develop it. If we find a similar group of people working along lines of charitable or philanthropic activity we work through them. When we visit a locality we always insist on seeing the local conditions at first hand. We are not willing to take other people's impressions of a city's slums. Our own investigations always disclose some conditions that people were not aware of. In a quick way we

make an examination of the slums of the city and get a first-hand impression of what the housing conditions are. We go into cellars and alleys. We look at the plumbing. We go on the roofs.

Now, what happens after we have made a visit of this kind? We nearly always find that the main evils are those I have stated. Often sanitary conditions are neglected. Alleys are piled high with rubbish, filth, and refuse of every kind. Privies are neglected. Cellars are foul and rooms are overcrowded and poorly ventilated. Often we find that the local health department is not aware of these conditions; more frequently, however, we discover that the local health officer is doing everything he can to overcome these evils but is working and has for years been working without a sufficient appropriation to enable him to overcome them. We always assume that to be the attitude of the local health officer, even sometimes when we know it to be the contrary. Thus, sympathetically, we work with the local health department. It always strikes me anew as strange each time I encounter it, that so many good citizens seem instinctively to regard the local health officials and, in fact, all public officials as either incompetent or corrupt. Too frequently it happens that they have never taken the pains to familiarize themselves with the particular problems that the health officers have to face, have never looked into the difficulties he has to encounter—the limitations of the statute, the inadequate force and inadequate funds with which he has to carry on his work. Our chief function is to break down that feeling of antagonism towards the public official. We always assume that the health officer is as anxious to improve the conditions as we are. And we ask the good citizens with whom we are working locally to put themselves in the place of the health officer and stand behind him in his work. To such a body of citizens we say: "Bring to the support of your health officials your authority and standing in the community, make evident through the public press, through meetings, through letters, through personal relations with the finance committee, the council or aldermen, the needs of the health department and the public sentiment there is behind such work." To the local health officer we say: "Take such citizens around and show them the bad conditions in your slums; let them realize that these conditions are allowed to exist because the health department has not sufficient money to pay for inspectors to stop them, and that you cannot stop them unless you have the money." Your local committee thus becomes your strongest aid, and instead of condemning you as in the past, now aids you in getting what you need.

One other word. I should like to ask the members of this Association who are health officers, to consider frankly whether their methods of san-

itary work have kept pace with the changed conditions which have developed in this country in our cities in the last twenty-five years. If they do ask themselves this question they will find, I think, that they are working under the methods of procedure which obtained twenty-five years ago. But these methods will not do today. Twenty-five years ago we had a homogenous American population; today we are dealing with numerous colonies of a foreign-born population, and it won't do for us to sit down and wait for citizens to send to us complaints of sanitary abuses. This is a relic of a pre-glacial sanitary period. Let us substitute for that antiquated method a system of complete, thorough, and frequent sanitary inspection of every tenement house, upon the initiative of our health authorities.

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS.

By DR. LIVINGSTON FARRAND,
New York City.

When the National Association took up its work some five years ago, it was recognized that the great immediate problem in the prevention of tuberculosis was one of public education. We were concerned not so much with the cure or with pathological investigation as we were with a broad educational campaign. That campaign had certain distinct ends in view. There was first of all the education of the public with regard to the simple facts of the infectiousness, preventability, and curability of tuberculosis, and the accompanying necessity for a sound personal hygiene. But of equal importance in reaching definite results was the education of public sentiment to a point where it would demand and secure proper legislation and adequate provision for tuberculous cases through hospitals, sanatoria, and dispensaries; this last not so much with a view to the care or cure of the cases themselves as to prevent the extension of the disease through the presence of those cases in the community.

Confronted with such a problem, it was obvious that organization was a first necessity. The campaign opened with practically nothing at hand. Five years ago there were in the United States twenty committees or associations for the prevention of tuberculosis. At first thought, the obvious procedure was to organize a national body with branches in every state and local societies in every community of every state. This sort of rigid organization is an extremely easy matter to bring about on paper, but one of the hardest things in the world to accomplish efficiently; and in a country as wide as ours, and presenting as sharply differentiated problems as ours, it is often one of the most inefficient methods of procedure. One cannot handle a campaign in Texas following the exact lines that may be applicable to Maine. Recognizing the universal applicability of certain truths, it must also be recognized that the plan of one state can seldom be applied in any detail to another. It was therefore decided at the outset of the national campaign against tuberculosis, that a rigid machinery should not be established, but that elasticity should always be provided for; and I think our experience has shown that that attitude was

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

wise. While we have organized state associations wherever possible, we have always laid particular stress upon the local organization. In certain states it would appear that after the local organizations have been provided for, the state association has practically fulfilled its purpose. This, again, cannot be laid down as a universal rule, for in certain of our commonwealths it appears that the campaign can still best be operated on a state basis.

The results of the five years' work are that instead of twenty committees there are now four hundred and thirty-five distinct associations devoted to the prevention of tuberculosis in the United States. Practically every section of the country is provided for; practically every city of any size has its association charged with the responsibility for the local problem. With the speed and momentum with which the movement is now progressing, it would seem that in a very short time there will be an organized campaign in practically every community in the United States.

As the work has progressed, attitudes that were at first but tentative have become more fixed and definite. Among the most important of these is the standpoint that the responsibility for the fight against tuberculosis in any community must ultimately be placed squarely upon the shoulders of the local public authorities. It is not a problem that can be handled from a national center. Helpful as the establishment of a National Department, or Bureau of Health, would be, such a foundation could never be more than a useful auxiliary in the fight against tuberculosis, and I infer that the same would hold true of other fields of preventive medicine. It is likewise not a problem to be handled, except in certain instances, upon a state basis. The problem of tuberculosis and its prevention, rooted as it is in living conditions, is a local problem, and its solution will inevitably appear along local lines.

In recognizing the responsibility of the local public authorities we are not overlooking the imperative demand for private and voluntary work. It should never be forgotten, however, that such private activity should be directed toward stimulation and education rather than toward the foundation, direction, and operation of institutions and similar agencies. With regard to this point I think practically a general agreement has now been reached.

One of our greatest problems has been the securing of adequate legislation, either directed specifically against the disease or enabling communities to establish provision upon an adequate scale. In certain of our states the legislation is now abreast of the best expert opinion; in others, much remains to be done, but the outlook is distinctly encouraging. One of the most significant signs of the way in which public authorities are

recognizing their responsibility is the fact that of the expenditures for tuberculosis purposes in the United States in 1909, fifty per cent., as nearly as we can calculate, of the money expended was from public funds. In 1910, according to our best information, nearly seventy-five per cent. of the total amount which shall have been expended in the country to fight this disease will have come from public resources.

Naturally the growth of the sanatorium and hospital movement, with the idea not only of care and cure, but of segregation and the removal of centers of infection, has been slow, but it is now moving with increasing rapidity. There are twenty-two thousand beds for tuberculous cases in the United States, obviously but a drop in the bucket compared with the necessities of the situation, but we can see fairly clearly the possibility of much more adequate provision along these lines in the comparatively near future. It is upon the extension of this specific equipment that we are laying particular stress at the present time.

Now, as we have progressed and branched out along the many lines of operation which have presented themselves, we have naturally come in touch with practically every one of these movements for public health or for social betterment which are represented here today. With respect to these movements, one great truth which should never be forgotten, has been brought out most clearly; namely, that the prevention of tuberculosis and the campaign against it is simply one phase of the great world campaign against preventable disease and in the interest of public health. While this should never be forgotten, we should also recognize clearly that the human mind is so constituted that in order to obtain results in any great field such as this, we must deal with specific problems. One cannot go to a community and talk generalities and get a response. If one talks tuberculosis or child labor or infant mortality, or prevention of blindness, one can get a response; and this, it seems to me, is at the present time the method that must be pursued and is entirely justified so long as we recognize always that we are simply co-ordinate branches of one great movement.

I see no reason for "viewing with alarm" the multiplication of these societies, if we recognize the true situation. On the contrary, their foundation is distinctly a sign of encouragement. Let us grant that with the rapid multiplication of societies there is a certain duplication of energy. Let us grant that a certain confusion in the public mind is inevitable, but let us not be misled into inferring that such duplication of energy and such unavoidable confusion approach in importance or even begin to outweigh the permanent and important results which are being reached.

That we should recognize these situations and be planning as wisely as may be to eliminate the disadvantages is obvious. I believe the best result

that can come from such a conference as this is not the laying down of a distinct plan of operation, because none of us is wise enough to say what is the best plan of operation, but to take some step looking toward constant conference and cordial co-operation and with a view to a possible ultimate union of all of these movements in one wisely administered campaign.

Personally, I think the best thing and the only thing that can be done will be some action looking toward a conference of committees from all of the public health agencies of recognized standing in the United States, to consider some preliminary plan for co-operation, and I hope that the initiative in such action will be taken by this Association and by no other.

Laboratory Section

HISTORY AND CHEMISTRY OF DISINFECTANTS.*

By DR. WM. DREYFUS,
New York City.

Man has an instinctive repugnance to all noxious odors, and from the earliest time has sought to mask their presence by the use of aromatic substances. The use of perfumes is probably a relic of the effort of primitive man to counteract this evil. Many religious ceremonies, such as the burning of incense, have also the same origin, and embalming, as practiced by the Egyptians, is a good example of successful attempts to arrest putrefaction in very early ages. Sulphur has been employed from the earliest times, and Homer describes its use in religious ceremonies. In the time of Hippocrates, sulphur was regarded as an antidote against the plague. Ovid makes mention of the fact that sulphur was employed by the shepherds of his time for bleaching fleeces and for purifying their wool from contagious diseases. During the plague of Athens, Acron, according to Plutarch, stayed the spread of the epidemic by lighting fires in the middle of the public places and in the streets where deaths had occurred; and the lighting of fires during times of plague has been customary until quite recent times.

The Mosaic law, with all its minute instructions as to the purification of the people and their belongings, shows the same combination of religious ceremonial and sanitary precautions. The preservation of physical well-being is looked upon in Judaism as a religious command. The neglect of one's health was regarded as a sin; and the Nazarite who vowed to abstain from wine was considered a sinner, as well as he who fasted or underwent other penance without reason. There was not a distinct department of public health in the government of the ancient Jews. The charge of infectious diseases, such as leprosy, and of epidemics of all kinds, was delegated to the priests, who acted as the physicians. The Talmud mentions the office of a physician in the Temple, whose duty it was to look after the health of the priests. In later times every town counted among its permanent officials a physician who supervised the circumcision

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

of children and looked after the communal well-being. A scholar was forbidden to live in a city where there was no physician. For domestic sanitation the commandments given in the Bible direct the covering of the blood of a fowl or of a wild beast with dust, and the covering of excreta with earth, and the appointing of a special place outside of the camp for depositing the excreta. In order to prevent the spread of leprosy, a complete system of quarantine laws was developed in the Levitical code. Here I may mention that from the data of various writers, it is reasonable to conclude that Biblical and modern leprosy are, in all probability, not the same disease, the former not being considered contagious, the segregation of lepers being regarded, at any rate, at certain periods, more in the light of a religious ceremonial than as a hygienic restriction. The numerous laws of purity and health scattered throughout the Bible were afterward regarded as important factors, and the system of bath ablution which forms a large portion of the Jewish laws of cleanliness has had a marked influence on the physical health of the people, so that in epidemics they have frequently been immune.

The Indian who, instead of embalming or burying his dead friend, hangs the body under a tree exposed to the air, makes use of the property of dessication, which, as is well known, is very efficient in arresting decay, and is the basis of a modern patent for keeping yeast. Earth is a very powerful deodorant and will also act as an antiseptic; the gases given off by decaying bodies are absorbed, and thus the burying of a body under proper conditions may be regarded as an efficient means of disinfection. The use of fire for cremating bodies undergoing decay or likely to cause a nuisance is, of course, an illustration of the employment of heat for the destruction of micro-organisms.

DISINFECTION IN THE MIDDLE AGES.

During the long period of the Middle Ages, the alchemists did little to advance our knowledge of this subject; they collected a few facts, and described, with more or less accuracy, the properties of some of the more important chemical compounds; but one may search in vain for a correct account of any example of preventive medicine. Notwithstanding the ravages of the cholera, the plague, and other epidemics, as well as the frequency of leprosy, the idea of contagion was only imperfectly understood, and the common people were far less cleanly in their habits than the Jews, for example, or heathen nations, who, as we have already mentioned, mingled primitive sanitary precautions with their religious services. Perhaps one of the earliest papers of any importance which we have is a "*Memoire sur les substances septiques et antiseptiques,*" written by Pringle in

the middle of the eighteenth century. In this memoir some forty-eight experiments are described, in which the author took pieces of fresh meat and placed them in contact with various amounts of substances which he believed to have an antiseptic action. Amongst the substances tried we find common salt, sal ammoniac, acetates of ammonia and potash, nitre, borax, camphor, aloes, and succinic acid. These experiments, which were conducted in a very systematic manner, are even now not without some value. By taking as a standard the antiseptic action of sixty grains of salt on two grains of meat in two ounces of water, he was able to show that the other substances enumerated above had a greater antiseptic power than this standard, and thus succeeded in arriving at their relative antiseptic value.

BACTERIOLOGY.

Even the pioneers of modern chemistry at the beginning of the present century, did little towards promoting our knowledge of disinfectants, and it was not until the biologists showed that decay was due to the action of living organisms which float in the air, that fresh attention was directed to the subject. Francesco Redi, by protecting meat from flies with wire gauze, showed that the maggots which infest decaying flesh were produced from the eggs of the flies. Subsequently the formation of molds on the surface of jams, or other organic substances, was similarly shown to be determined by micro-organisms floating in the air. It was further noticed that filtration of air through cotton wool was effectual, not only in removing the dust, but also in preventing the ingress of micro-organisms.

The gradual accumulation of such facts as these by the biologists led the chemists to realize that the removal of the odor was not, after all, the only work necessary; and thus fumigation with nitrous acid, hydrochloric acid, chlorine, and other pungent bodies, which had been recommended, fell gradually into disfavor.

Pasteur's work, together with the general development of the modern science of bacteriology, has given to chemists a means of ascertaining the relative value of the various chemical substances discovered from time to time. It was to Pasteur's careful investigations that the close analogy which exists between fermentation and putrefaction was established. Pasteur himself defined putrefaction as "fermentation without oxygen," and showed that all decay was due to the action of organisms, the *Bacterium termo* being the common organism which begins eremacausis.

Owing to the slight knowledge which we possess as yet of the nature of the pabulum in which these bacteria of decay live, the investigation of the way in which they act is a matter of great difficulty. In recent years, however, the life-history of known organisms has been carefully studied, and the chemical changes which are produced when they live in media of known compositions have been followed. The organisms have been allowed to grow in solutions of calcium formate and calcium acetate, both of which substances have a definite chemical constitution. The bacteria decompose these salts, evolving carbonic acid gas, mixed with hydrogen in the former solution, and carbonic acid, mixed with marsh gas, in the latter. Lactic acid and its salts, butyric acid and its compounds, have also in recent years been examined bacteriologically. From studies such as these it seems to be clearly established that, just as yeast is killed by the alcohol it produces, when it converts sugar into alcohol so these other micro-organisms secrete chemical compounds which are inimical to their own life. In the decomposition of animal matter containing nitrogen, compounds which are soluble in weak alkaline solutions, and known as alkali albumens, are first produced; and these subsequently change into albumoses and peptones, to be again broken down into tyrosine, indol, and other compounds. These latter have strong antiseptic properties and illustrate the facts already alluded to, viz., that the products of decomposition are in the majority of cases themselves inimical to the bacteria which give rise to them.

By disinfection we mean that the power which the living organism possesses of infecting a healthy individual or animal has been destroyed.

This is brought about in various ways:

1. By natural processes, such as air, light,—particularly sunlight—rain, natural filtration, and dessication.

2. By mechanical means, such as artificial filtration, absorption and heat.

3. By chemical agents.

This comprises an exceptionally large group of products, and it is impossible in this short space of time to take them all up in detail. I shall limit myself only to a brief description of those that mostly interest the sanitarian, and endeavor to familiarize him with their most important chemical and bacteriological properties, in order, in the absence of official guidance, to make the proper selection, when the question of disinfection is brought before him.

While it is probably difficult to explain the manner in which disinfection is accomplished in many cases, still I think the subject is best approached from a purely chemical standpoint.

We can divide the disinfectants generally used into five distinct classes:

(A) Those that act as reducing agents.

To this group belong the sulphites, sulphur-dioxide, and ferrous salts, such as copperas. The reducing disinfectants are open to the objections that they are in great part wasted at first by the free oxygen of the air and the water, lose their strength by absorption of oxygen and do not act on anaerobic bacteria.

(B) Those that act as oxidizing agents.

To this group belong chlorine, bromine, hypochlorites, peroxides, permanganates, ozone, and various commercial preparations, whose efficiency depends on the amount of available chlorine. The greatest objections to the substances in this group is that they are very unstable, some rather expensive, and some corrosive to tissue and metals; they are mostly employed for special work only, such as water purification or sewage treatment.

(C) Those that act as absorbents and deodorants.

To this group belong sulphate of lime, or gypsum, slaked lime, and quicklime.

(D) Those that act by their toxic power and as precipitants of albuminous matter.

This group comprises most of the metallic salts, such as those of mercury, zinc, copper, silver, etc. Very little that is new can be added to the chemistry of this group. It is well known that, according to the theory of ionization, a salt when dissolved in water becomes more or less dissociated, and that the amount of metallic ions is greater with the chloride salt, than with any other, which probably explains their higher efficiency.

(E) Those that enter into chemical combination with albuminous matter and form new products that resist further decomposition by bacteria.

The most representative type in this class is formaldehyde, which is the ideal disinfectant for room fumigation, when properly used, i. e., in its gaseous form, in the presence of water vapor. Of late years, however, it has been found that in its aqueous solution, such as formalin, it is far inferior to pure phenol, possessing only one-third the bacteriological efficiency of the latter.

A good many disinfectants combine one or more qualities mentioned in the preceding grouping and thereby form a special class by themselves.

A group of organic substances obtained in the destructive distillation of tar, which constitute today the most important branch of disinfectants for all practical work, are products such as phenol, cresols, and phenoloids, and a good many commercial preparations containing the

above either with or without hydrocarbon oils, forming with water, either clear solutions or emulsions. Their action is based either on precipitating albuminous matter or on toxicity of their constituents, which is highest with phenol, and decreases as the hydrogen of the benzine ring is replaced by either methyl of hydroxyl groups. The best of these commercial products are far superior in their bacteriological efficiency to pure phenol or cresols, being less toxic and corrosive, and possess the great advantage over all other disinfectants, that their emulsions have a thoroughly cleansing effect, acting to all purposes and intent like a liquid soap. The superior efficiency of the emulsifying disinfectants is best explained by the fact that the particles of the emulsion exhibit active Brownian movement, and that the bacteria practically become surrounded by the disinfectant in much greater concentration than exists throughout the liquid.

In concluding, I should like to emphasize the fact that the time has come when the sale of disinfectants should be put under governmental and scientific control, for this industry has grown to such an extent in recent years that the public is entitled to protection from frauds and impositions.

THE TESTING OF LIQUID DISINFECTANTS.*

By HENRY ALBERT, M. D.,
Iowa City, Iowa.

It is a matter of common knowledge that of the very numerous liquid disinfectants which we find on the market and over the sale of which there is practically no control, many are almost useless as disinfectants, and many more are not as efficient as they are claimed to be. It is very obvious that there ought to be some standard by which different disinfectants may be compared. It is indeed true that such comparisons have often been made and that carbolic acid has usually been chosen as the agent with which others have been compared. It has frequently happened, however, that the results of different tests have greatly varied, and this has no doubt been largely due to the difference in method of making the tests. As an essential step, therefore, for standardization, it is necessary that the laboratory workers making the tests agree on some one method by which the tests are to be made. Without burdening you with tables showing the comparative merits of several different methods of testing liquid disinfectants as I have found them, I may say that I do not regard any method in which the micro-organisms used for the test are dried, as reliable. With the use of such under conditions apparently the same, I have obtained quite widely varying results. I have found that the "drop method," described by Rideal and Walker in 1903, or some of its modifications, gives more uniform results than any other method tried. Because of the uniformity of results obtained, the simplicity of the procedure and rapidity of making the test, I regard it as the best method which we have at the present time for the testing of liquid disinfectants. This method is, as yet, however, not entirely satisfactory. The results of different workers using the method have not always been the same. Some of the factors that have governed these varying results are:

1. The carbolic acid chosen for the test. Some of the published reports have been based on the use of carbolic acid such as is obtained from the commercial supply houses without any attempt at standardization. Many of the other reports so far published have apparently used carbolic acid standardized chemically by Koppeshaar's bromide titration method. Such does not, however, appear to be sufficient. Carbolic acid

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

may be standardized by this method and still contain cresols which may markedly increase its germicidal power. It is necessary to not only know the strength of the carbolic acid that is used but also to know that it is pure.

2. The organism used. *Bacillus typhosus* appears to be the most suitable organism for making the test. Nevertheless, different disinfectants appear to have a different effect on various organisms, i. e., one disinfectant may be more efficacious than another against a certain micro-organism, and the reverse be true when another kind of organism is used. More work should be done along this line. It may be that in making the test several different types of organisms should be used.

3. Temperature. It is well known that the higher the (ordinary) temperature the more efficient the action of the disinfectant. I have found that at a temperature of 60° F. a 2 per cent. solution of phenol failed to destroy the *Bacillus typhosus* after an exposure of four minutes, whereas at 90° F. the micro-organism was destroyed by a one minute exposure to the same disinfectant.

These three factors I regard as being of most importance. The age of the culture, kind of medium, reaction of medium, and temperature of incubation, I believe to be of less importance. Nevertheless, all of the factors ought to be carefully investigated.

With the adoption by scientific men and organizations of a method of standardizing disinfectants, it will soon become necessary for commercial concerns to indicate the disinfecting strength on the label of their products. It will then be necessary to verify their statement. This can be quite satisfactorily done by the larger organizations, and by many municipalities and states that have facilities for testing the reagents which they purchase. To do the greatest amount of good, however, it appears to me that tests ought to be made in a federal laboratory such as the Hygienic Laboratory of the Public Health and Marine Hospital Service, that the results of the tests be published, and if possible, that steps be taken to prohibit manufacturers from misbranding their products by means similar to those exercised by the pure food and drugs act, over the products concerned. If necessary, such control may be supplemented by tests made in state laboratories in order to govern the products sold in individual states.

SECOND PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL DIAGNOSIS OF DIPHTHERIA.

When this Committee was first formed, a circular letter was sent by the Chairman to the members of the Committee in order to obtain their views as to the scope of work which should be undertaken. It was decided that the work of the Committee should not be restricted to technical details alone, but that questions of organization should also be considered, since much depends on the proper handling of specimens. The first year was devoted largely to correspondence, and as a result of this interchange of ideas, the first report was made outlining the future work of the Committee.

In the two years that have intervened since the first report, it has been found impossible to cover all the ground outlined, but much has been accomplished, and as is usual in work of this nature, some new lines of work have been indicated.

DISTRIBUTION AND COLLECTION OF OUTFITS.

(a) Cities:—Two entirely separate systems of distribution and collection of outfit must be considered—one for cities, the other for states. In cities, distances are not so great but that this part of the work can be kept very closely under control. Some cities make use of police stations as centers for distribution and collection, and of policemen for the final return of the outfits to the laboratory. Other cities use drug stores and paid messengers, while others have various modifications of these systems, varying with the ordinances of the city, and the ideas of the health officials. The Committee believes it immaterial what system is adopted as long as the outfits are kept in a proper manner, are instantly available for the use of physicians, and are expeditiously returned to the laboratory after use.

(b) States:—The distribution and collection of outfits in states presents a far different problem, owing to the distance factor. Some states make use of drug stores in centrally located cities and towns; others use local health offices; while others send the outfits directly to physicians. Various factors have to be considered in this question, it being apparently dependent to some extent on the class of health officers, whether laymen

or physicians; but the number of stations that can be established is dependent to a large extent on the size of the state and the extent of its resources. Since state outfits are more costly on account of the necessity of using mailing cases, or boxes strong enough to stand express handling, the greatest difficulty lies in the proper control of the stations. The average country drug store is lax in its methods, and even if paid for its service, is apt to look upon it as of little importance, and to neglect to keep constantly supplied, even if every facility is offered for so doing.

USE OF SERUM IN OUTFITS.

(a) Cities:—There appears to be no question but that the use of serum in outfits is advantageous in cities, since in the first place the difference in the time of the inoculation of the serum, whether at the bedside or the laboratory, is usually so small as to be of little moment, while the amount of labor saved the laboratory by the bedside inoculation is considerable in large cities. It may be claimed that laboratory inoculation would be more thorough, and this is probably true at first, but physicians in cities, as a rule, rapidly learn the proper manipulations. Some laboratories use glycerine in preparing serum with the idea that it delays drying, but this is open to serious doubt. The use of a sterilized cork stopper inside the cotton plug delays evaporation, and is in fairly common use. Since in cities the outfit stations are within easy reach, and old outfits can be readily exchanged for fresh, it is not the general custom to seal the serum tube hermetically.

(b) States:—Sealing becomes necessary, as the expense of exchanging outfits is considerable. The breaking of the serum in transit is also a factor to be considered. A much more important matter is the determination of the influence of the time and temperature factor on the inoculated serum on the value of the result obtained. If the serum is inoculated at the bedside, then each culture arriving at the laboratory will have been exposed for varying lengths of time to varying degrees of temperature, with the consequent opportunity for the growth of organisms antagonistic to the diphtheria bacillus. The temperature may vary in winter from that of the vicinity of the radiator in the express or post-office, to the freezing temperature of out-of-doors, or in summer, from the interior of the refrigerator to that of the direct sunlight; while the time factor will vary with the distance of the patient from the laboratory and with the transportation facilities. If the swab is left in contact with the serum after inoculation, a third factor, the influence of the swab material, be it iron, wood, brass, or aluminum, is introduced.

On the influence of the temperature factor on the overgrowth or antagonism of other organisms, nothing has so far been accomplished. On the factors of time and swab material three members of the Committee only were able to carry on experimental work.

Dr. Slack, with Dr. Arms and Miss Wade, taking six swabs at a time from 24 patients on cotton tipped swabs made of wood, iron, and brass, came to the following conclusions:

1. "For ordinary cultural work, where the serum is to be inoculated immediately after the swab is taken, wooden swab sticks give the best results, both in the number of positives obtained and the excellence of the types.

2. If inoculation is to be delayed a day or two, as is the case where swabs only are sent out from state laboratories and inoculated on their return, better results will be obtained from iron swabs.

3. The results obtained indicate that, with the ordinary cultural methods, negative laboratory results on positive cases, either for diagnosis or release, may often be due to overgrowth by ordinary throat organisms.

4. The adoption of the method of sending swabs only from the laboratory, to be inoculated on return to same, would result in state laboratories, where such swabs may be a day or two in transit, in more accurate diagnosis than is possible where immediate inoculations are made, and, incidentally, cases would probably be held longer in quarantine.

5. Leaving the swabs on the serum after inoculation has no adverse effect on the result when the culture is properly made."

The experimenters further emphasize that "It was noticeable not only that more positive results were obtained from the older swabs, but also that the types of bacilli were better and the cultures more nearly pure."

Dr. Anna Williams, working with six positive cases, found no apparent difference between cultures from swabs inoculated immediately and those inoculated after one, two, and three days, nor did she discover any reportable differences between serum growths exposed to iron wire and to wooden swabs.

In both of the preceding cases the cultures and swabs were taken directly from the bedside to the laboratory, the cultures incubated, and the swabs held at room temperature until inoculated.

Dr. Chesley obtained cultures taken by physicians from 440 patients. Of these, 204 cases showed diphtheria bacilli. Of the 635 cultures taken, 238 gave a different result on the swabs for laboratory inoculation from that shown by the bedside cultures. For example: Of 114 positive on the bedside inoculation cultures, none were positive from the same swabs

taken to the laboratory and inoculated, and only 14 showed suspicious bacilli. Five cultures only of those negative on the bedside inoculation cultures were positive on the delayed inoculations, and 6 only were suspicious.

These cultures were taken by practicing physicians in 118 different localities during midwinter. The fact that they were taken by local physicians, rather than by laboratory men experienced in culture taking, may account in a minor way for the discrepancy in results obtained by this member of the Committee, but the inference is strong that the temperature factor is more likely to be responsible.

From the results so far obtained, it would appear necessary to obtain further confirmative evidence on the effect of wood, brass, and aluminum swabs on the serum growth, both when the swabs are held for a time before inoculating and when held in contact with the serum, and to conduct further tests on the relative value of serum inoculations at the bedside and on delayed laboratory inoculations under such conditions that the factors of time, temperature, and personal equation may be properly controlled.

DRIED SERUM.

A dried serum has been submitted to the chairman during the past year, but too late and in insufficient quantity for tests by individual members. If it can be produced in sufficient quantities and at a reasonable price, it will undoubtedly prove of value, especially to laboratories situated at a distance from slaughtering houses. Preliminary tests indicate that media made from the dried serum is fairly satisfactory.

TYPES OF B. DIPHTHERIA.

There is a marked uniformity of opinion among the members of the Committee as to the types of bacilli to be considered positive for diagnosis and release, A C D and C_1 being considered by the majority as positive for diagnosis, and A_1 D_1 E G and E_1 as suspicious forms. One member of the Committee includes as suspicious E_2, and other solid types, if brilliantly stained. One member of the Committee does not follow Wesbrook's types, taking the ground that there are too many intermediate forms, and that the microscopic picture as a whole, including the grouping and the staining qualities of the organisms, must be considered. This is of course true, and is probably the unspoken opinion of the rest of the Committee; Wesbrook, himself, regards them as types only. The experience of the Chairman and of some of the other members of the Committee has been that Wesbrook's types are an invaluable guide, that in a positive culture some

of the above quoted forms will invariably be present in greater or less abundance, and that the recording of types by the diagnostician results in a beneficial mental attitude and training.

In order to measure the personal equation and the effect of geographical location, and to eliminate other factors, it was at first decided to send each member of the Committee serum and stain from the same batch, and to have positive cultures made on this special serum, slides made from these, diagnosis and types recorded, and the records and slides sent to the Chairman. It was then planned to exchange the slides, thus securing the opinion of each member of the Committee on each set of slides. During 1909, thirty tubes of serum and a four ounce bottle of Loeffler's methylene blue was sent to each member, but owing to a variety of causes, responses were so few as to be valueless for the purposes outlined.

During 1910, the experiment outlined was repeated with the modification that each member used his own serum and stain. The total number of slides per member was cut from thirty to twenty, on account of the amount of work involved in record keeping, etc. Some of the members of the Committee reported predominant types only, as requested, while others reported all types found. Summarizing the results, there appears to be a fair unanimity of opinion as to what should be called positive for diagnosis or release, but the difference, while small, is greater than it should be. There is a decided difference of opinion in the identification of types and in the selection of the predominant type.

It is evident that more work is necessary on types, and that to secure more comparable and prompt results it will be necessary to organize the work somewhat differently. For the coming year it is proposed:

1. To prepare, say, 25 smears, made from routine cultures, submitted for diagnosis (positives mixed with some negatives), and, say, 25 smears from cultures submitted for release from quarantine, and to submit these slides to each member of the Committee in turn, together with a prepared form or blank for reporting results. This should give better defined evidence as to personal equation both in diagnosis and in the selection of types.

2. To isolate pure cultures of diphtheria bacilli and to obtain, so far as possible, cultures of one type, submitting slides of such cultures to members of the Committee for the identification of types, for the acid reaction on sugar bouillons, and in the case of types not considered positive for diagnosis, for virulence.

3. To isolate in pure culture, xerosis, and other atypical bacilli of the diphtheria group for study of the acid reaction and virulence.

4. To study the variation in type due to variation in the composition of media and of other factors.

GEOGRAPHICAL DISTRIBUTION OF TYPES.

No distinct differences in type, according to geographical location, were noticed—with one exception, namely, Providence. The predominant types on the slides from this source were practically without exception solid staining small types ($C_2D_2E_2$). Gorham considers these organisms positive and virulent, and states that the larger forms are seldom to be seen in that vicinity. It might naturally be supposed that this difference in type might come from difference in the media employed or other purely local factors, were it not for the fact that this difference was noticed in 1902 during the experimental work on "Diphtheria in Well Persons," carried out under the auspices of the Massachusetts Association of Boards of Health. At that time cultures were exchanged between the Boston and Providence laboratories, but the Providence organisms remained small in form on Boston media, and the Boston organisms remained A's, C's, and D's on Providence media. Here is evidently a fruitful field for future work.

DETERMINATION OF VIRULENCE.

No experiments on virulence have been thus far carried out by the Committee. Future work should include:

1. The selection by the Committee of a standard method for determining virulence.

2. The determination of virulence of specific types in so far as these may be obtained in pure culture.

3. The determination of virulence of other members of the diphtheria group.

4. The determination of the point at which the line is to be drawn between virulence and non-virulence.

INCUBATION.

Experiments by certain members of the Committee have shown that atypical organisms from serum incubated over night may finally develop into typical bacilli by re-incubating the original culture or by making a fresh culture from the original. While, from the standpoint of practicability, the regular time of incubation must remain from 15 to 20 hours,

(overnight), there is a distinct advantage (over and above that of making an early report in positive cases) in making a microscopic examination at the end of five hours. It must be "recognized in dealing with cultures for diagnosis that the associated organisms may be either symbiotic, neutral, or antagonistic, and that while in a large percentage of cases the diphtheria bacillus may be relied upon to outgrow the other organisms in 15 hours incubation, there are a small number in which the associated organisms obscure the result at the end of this time, the diphtheria bacillus appearing in larger numbers either on shorter or longer incubation periods, depending on the growth of these other organisms."*

INTERPRETATION OF RESULTS.

In view of the fact that there is a tendency to place either too little or too great dependency on the results of bacterial tests, it is the opinion of the Committee that when the final report shall be written it should contain a carefully written interpretation of the meaning of positive, negative, atypical, and "no growth" results, in order that such bacteriologists may be in a position to quote the Committee on these points when bacterial and clinical evidence differ.

REPORTING AND RECORDING RESULTS.

While some variation may well exist in systems of recording and reporting results, yet it is suggested that some general system of working might well be adopted by the Committee in preparing its final report.

B. R. Rickards, *Chairman*.

*Rickards, Slack and Arms.—American Jour. Pub. Hygiene, Vol. 5, p. 324.

Section of Municipal Health Officers

QUARANTINE OR ISOLATION IN DIPHTHERIA?

By JAMES ROBERTS, M. D.,
Medical Officer of Health, Hamilton, Ontario.

Most physicians engaged to any extent in the public health service do not need today to be convinced of the dominance of the personal contact factor in diphtheria.

Defective drainage, damp cellar, bad ventilation theories, as explanatory of the incidence of the disease, have for a long time been recognized on bacteriological grounds as untenable. As predisposing influences, the conviction is widespread that these and other circumstances play a significant part in its causation, and there is probably more or less justification for the belief that insanitary home surroundings, malnutrition, overcrowding, and parental neglect, all prejudicial to health, exert a more or less definite and favorable influence on the appearance and spread of diphtheria, tuberculosis, and typhoid fever.

In looking over our records for the past five years, no less than 45% of our cases, representing not more than one-fourth of the school population, are derived from the districts of the city where the industrial classes are centered, where the housing is inferior, the sewer accommodation insufficient, the families large, and where overcrowding exists to a greater or less extent. Furthermore, this population, largely impregnated with the foreign element, is very considerably below the average of the citizens in mental development, and hence lacks the ability to appreciate the laws of hygiene and sanitation, and it is this latter fact, after all, I believe, that acquires special emphasis, the more minutely we examine and investigate notifications of this disease whether appearing in endemic or epidemic form. Two recent experiences will illustrate this contention.

Late one evening one of our local physicians called me by telephone. She had just been in attendance on a case of laryngeal diphtheria in a girl of seven years. Until six o'clock the child had been apparently well, but shortly after the evening meal had suddenly been taken alarmingly ill and died in a few hours.

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* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

The family, English immigrants, were living under the most objectionable conditions of housing and cleanliness. Cousins from a block away came crowding in to increase the excitement. Neither the slightest precautionary measures nor sensibility of danger were noticeable—plenty of beer being the only disinfectant. Two boys had lately suffered from sore throats. All of the children showed infection with Klebs-Loeffler and were sent to the hospital. Preventive measures were taken in case of family number two, a child belonging to which died in the hospital a few days subsequently.

Another recent notification of diphtheria came from number 63 X Street, with intimation that children living on either side had suffered from sore throats. Personal investigation at numbers 61 and 65 obtained the following information:

A boy at number 61 had sore throat a week or so before. A little girl and a young woman were suffering from mild and suppurating tonsilitis respectively. There had been a doctor in attendance for both cases—conclusive evidence to the mother's mind of its not being diphtheria. At number 65 the father, mother, and two children were suffering from sore throats of a suspicious character. The man made numerous protests against the insufficient drainage from the street causing dampness in the cellars; even the physician in attendance at number 63 had noted this as an important circumstance. I was informed from other sources that this family had just been visited by a child only recently discharged from a New York isolation hospital, after recovering from a mixed infection of scarlet fever and diphtheria. Cultures from the suspects in all three houses showed diphtheria bacilli.

Our New York visitor went from Hamilton to Toronto to the home of another relative. The two children were seized some days after with diphtheria in virulent form, the girl of 11 years dying within 24 hours after the first manifestation of clinical symptoms; the boy, 9 years old, a few days later. We are still receiving unfounded complaints of the sanitation of the street, so pertinaciously does the popular mind cling to traditional ideas.

Our notification tables indicate that diphtheria is most prevalent during the nine months beginning with September and ending with May, and exhibit the well known sporadic prevalence of it during the months when the schools are closed. The infection once introduced into the schools in September seems to be more or less easily disseminated among the susceptible children, and tends to become epidemic in proportion to the number of susceptible children present and the virulence of the

particular infection, with overcrowding, ventilation, and seasonal variations, for obvious reasons, as factors of more or less incidental importance,

The greater prevalence of the disease during the cold winter months, especially January and February, can with great probability be accounted for by the well-known observation that the delicate mucous membranes lining the air passages are then more liable to attacks of catarrhal inflammation. The air in the room becomes close and vitiated—the extreme temperature outside tending to drive the children inside where games and sports are indulged in under every circumstance calculated to facilitate direct infection from one to another. With the return of May and June come baseball and outdoor games, purification of the schoolroom atmosphere, sunshine and the genial warmth of spring, all contributory influences towards fortifying the resistance of the tissues and minimizing the spread of infection.

We find ourselves, then, face to face with the practical difficulty of controlling a disease, common knowledge of which shows that, while sporadic cases may occur in the most healthful localities, there is little tendency for its propagation and appearance in epidemic form unless the infection finds its way into a school.

From the school it travels to the home, to the infant and adult members thereof, and in too many instances, there is little reason to doubt, back again to the school, either by the child first attacked being allowed to return to school before its nose and throat are free from infection or by some other child in the same household who has not been attacked conveying the infection in some unrecognized way.

The question which at once suggests itself is: How best can we prevent our schools from acting as centers of infection when diphtheria has gained its entrance into them? Obviously, by endeavoring to ascertain and estimate the character and extent of the invasion by inquiry, inspection, and bacteriological examination of the noses and throats where circumstances suggest.

The Boston Board of Health, after a recent and somewhat extensive inquiry into the "Diphtheria Bacillus Carriers in the Public Schools," concludes "that at least 1% of all healthy school children harbor morphologically typical diphtheria bacilli, transiently communicable from one person to another and ordinarily of little or no virulence; that where diphtheria does not exist, isolation of such carriers of probably non-virulent bacilli is useless, costly, laborious, and productive of hardship to innocent and harmless parties; that an attempt to control diphtheria in a city by a round of cultures from all school children at the beginning of the school year does not seem encouraging; that the proposition to stamp diphtheria

out of a city by cultural tests of all the inhabitants, and isolation of all carriers, is impossible from any practical standpoint."

In other words, the restriction of this disease by boards of health is, for practical purposes, limited to isolation of clinical cases and control of the contacts in connection with these.

For the accomplishment of such a task, I believe hospitalization to be the ideal method in a certain proportion of cases where isolation cannot be strictly and effectively carried out at home.

To attempt to carry out forcible hospitalization is to be met at the outset with a pronounced and emphatic popular prejudice against it. One experience in the Province of Ontario exemplifies this quite clearly. The regulations concerning diphtheria adopted by the Provincial Board of Health and made an Order in Council March 5, 1903, are worded as follows:

"On the occurrence of the first or any case of diphtheria in a municipality, the Medical Health Officer at once shall place the person attacked in the isolation hospital, tent, or other place provided, and shall take proper measures for placarding houses, for the disinfection of personal clothing, and, if necessary, the destruction of clothing which may have been exposed to the contagion, and for the disinfection and purification of every house, conveyance, rail-car, steamboat, sailing vessel, carriage, or other vehicle which may have been exposed to the contagion." With respect to scarlet fever a similar mandate was inserted.

In the City of Brantford these regulations were enforced with little deviation from the literal interpretation, until the opposition there, though more or less evident from the first, was headed by the Ministerial Alliance. A newspaper clipping will serve to illustrate their attitude.

"The ministers of Brantford have taken up the question of the compulsory removal of scarlet fever and diphtheria patients to the isolation hospital. The issue has been a burning one in this city for the past couple of years and a live one in the Ministerial Alliance for a month or so back. Coming in contact with many homes directly affected by a drastic enforcement of the regulations, the local ministers have learned many tales of hardship. These they have investigated, and they have also looked into the real aspect of the situation and the manner in which the regulations are enforced in other centers. As a result, the Alliance has taken prompt action in the matter, and on Saturday night a deputation waited on the Board of Health. They presented a pretty strong case, and asked for a more sympathetic enforcement of the law. The Board promised the usual consideration. The case of the ministry, together with the discussion, makes very interesting reading."

As a consequence of this agitation the decision of the Attorney General was asked for as to the legality of the Orders in Council. The result was a somewhat nominal victory for the Alliance in that local boards of health were referred to Section 93 of the Public Health Act for a definition of their powers which, after all, are by no means restricted.

This prejudice towards hospitalization is attributable, in large measure, to the slow evolution of the isolation hospital toward efficiency and up-to-dateness. Formerly maternity hospitals were condemned by many by reason of the high puerperal death rate which, on the introduction of aseptic precautions, was reduced from an enormity to practically nil. Similarly, isolation and pure air has converted tuberculosis from an incurable to a curable and preventable disease, and the treatment has been most effectively carried out in sanitaria specially designed for the benefit of the patients.

The general hospital, also largely provided and supported by private beneficence, has for its sole object the benefit of the patients treated in it, and in this respect differs from the isolation hospital, the onus of supplying which has been placed by legislatures on the municipal governments.

The primary object of the infectious fever hospital was thus different from that of the general hospitals, as it was for the admission of patients who are a source of danger to the community in which they live. The patient and his welfare have been regarded as secondary to the protection of the community. This marked departure of the isolation hospital in its main object from the primary object of the general hospital has had considerable influence on its development. The general hospital has remained abreast of the times to meet the demands of science. Its wards, both medical and surgical, have been renovated and remodelled; furniture and equipment, operating theatres and laboratories have been kept up to date. Can the same be stated of the infectious fever hospitals throughout the country? In too many instances they have retained their primitive characteristics in structure and arrangement without the advance in precautionary measures designed for the protection of the individual, so marked a feature of recent medical progress. So long as hospital provision for these infectious diseases is the outcome of panic resulting from the actual prevalence of an epidemic or the anticipated invasion of a disease, these provisions will continue to be so inadequate and unsuitable as to justify the scare headlines in the daily press with respect to mixed infection and its too often tragical results.

Following upon an expenditure of sixty thousand dollars in the city of Ottawa for a modern and attractive, but by no means perfect, hospital, the combined death rate from scarlet fever and diphtheria declined from

188 for the two years previous to its erection, to 48 in the first year after, 9 in the second, and 5 in the third.

Of the 114 diphtheria cases, 105 were removed to the hospital with 3 deaths. Of 157 scarlet fever cases, 145 were so removed with 2 deaths,—figures which indicate that over 92% of all cases of diphtheria and scarlet fever were treated in the city isolation hospital with a case death rate in the former disease of 2.6% and in the latter of 1.20%.

Until such time as the whole public becomes educated to regard hospital management in infectious diseases in its proper light, and, more especially, until finances are forthcoming for the building and equipment of infectious disease hospitals on a scale attractive and efficient enough to popularize them, we must be content in a goodly percentage of cases, especially among the well-to-do classes, with isolation at home. The quarantine of these home cases by putting a placard on the door and leaving the inmates to their own salvation, as has been required by law, is immeasurably more stupid and unjust, and indicative of a higher grade of density, than the reluctance of parents to parting from their children. Much of the hesitancy and concealment with respect to the reporting of cases is occasioned by such procedures. We are heartily in sympathy with the new regulations of our Provincial Board of Health permitting those who do not have the direct care of the diphtheria patient or patients to leave the premises in order to attend to their regular duties, except under exceptional circumstances.

Our present day conception of diphtheria as pre-eminently a school disease makes it imperative that the inspection of school children should be thorough enough for the detection of early cases and of those children harboring virulent bacilli. When this has been accomplished, regulations intelligently enforced providing for the proper isolation of all cases, either at home or in suitable institutions, will be productive of better results and much less annoyance and hardship than the continued enforcement of antiquated laws and regulations incompatible with our present knowledge of diphtheria.

Section on Vital Statistics

REGISTRATION OF BIRTHS.*

By F. D. BEAGLE,
Director Division of Vital Statistics, New York State Department of Health.

As noted in the circular of information recently mailed to the members of the American Public Health Association, "The Section on Vital Statistics is for the purpose of bringing about closer official and personal association of registration officials, and PROMOTING THE BETTER COLLECTION, compilation, and utilization of vital statistics."

We know that if society is to continue it must constantly be recruited by births. While our population is being increased by immigration, if we are to have a healthy growth, the number of births must exceed that of deaths.

Early notification of births is essential for the prevention of disease, and the total number of births in a state or city is the basis of that most important ratio known as infant mortality. The full measure of protection to infant life can not be extended unless ALL births are promptly registered. If we are to obtain accurate statistics of births, it is necessary that every birth should be properly reported to the local registrar of vital statistics.

As the importance of birth registration and the utilization of the statistics is to be fully covered in the papers to be read by the speakers who are to follow me, I shall devote my remarks to the question as to "How may we best promote the better collection of birth records?" In discussing this point I wish to call attention to recent amendments made to the registration laws in New York State, and to the effect of such legislation.

In New York State, up to within a few years, physicians were given thirty days in which to report births, and while there was no stated time in which certificates of deaths were to be filed with the local registrar, the law required the issuing of a burial permit before a corpse could be removed for burial, and this necessarily required the prompt reporting of deaths, as no burial permit could legally be issued until a certificate of death had

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

been filed with the person designated by the local board of health to issue burial permits.

Unfortunately, most of the local boards adopted an ordinance authorizing any member of the board to issue burial permits, and in the rural districts the Justices of the Peace issuing burial permits would neglect to file the certificates of death with the local registrar, in many instances, until months after the deaths occurred. Consequently the local registrar was months back in his returns, and the central office (State Department of Health) was continually receiving delayed returns which were not only a great annoyance to the Department, but which made it impossible to publish in our Monthly Bulletin accurate mortality statistics.

To correct this defect in the local registration, the Department devoted most of its energies through the Division of Vital Statistics to "jacking up" local boards of health, and to insisting upon prompt and complete reports of deaths being filed with the Department each month. The law was amended authorizing only the local registrar and health officer to issue burial permits; this insured the local registrar receiving prompt reports, and made it possible for him to file complete returns with the Department each month.

As our efforts to secure early and complete registration of deaths met with success, the Department was able to devote more time to improving the birth registration.

It was learned that many local boards of health were paying but little attention to enforcing the law requiring physicians to file certificates of births. When the State Department of Health insisted upon the local Boards enforcing the law, it was found that many physicians attending births had failed to make a note of the births attended by them; and, in making out the certificates at such time as suited their convenience, they would enter wrong dates of birth on the record, which later the Department would be called upon to correct, and which necessitated the filing of affidavits and a new certificate of birth giving correct date of birth.

To try to bring about a more prompt reporting of births, the law was amended in 1907 requiring physicians to report births attended by them within ten days, instead of thirty days, after the birth occurred.

By persistent efforts the Department succeeded in having the local boards of health take an active interest in improving the registration of births in their municipality, but the time limit made it possible for the physicians to put off from day to day the filing of certificates of births attended by them. It was therefore deemed advisable to shorten the time, in the belief that there was no good excuse for delaying the reporting of births.

Consequently, in 1909 the Department welcomed the recommendation of the Commission on Ophthalmia Neonatorum, of the American Public Health Association, to require physicians to report births within the shortest reasonable time, and the Department having been furnished with the necessary funds to provide the physicians throughout the state with the prophylactic solution recognized as an almost certain preventive agent for ophthalmia neonatorum, the law was amended requiring births to be reported within thirty-six hours after the birth occurred. This would not only tend to make prompt and complete reporting of births, but would also make it possible for the local boards of health to see that proper measures had been taken to prevent unnecessary blindness among the newly born; the information as to whether such precautions had been taken at time of birth being requested on the new form of birth certificate furnished local boards of health by the Department.

This amendment at first met with a good deal of objection on the part of the physicians, many claiming that the state had no right to demand such exacting services of a physician. To overcome this false impression the Department prepared a special article for publication in the Monthly Bulletin under the caption "The Physician and Vital Statistics," pointing out the fact that every physician in the State is protected by law, and that the state in giving them a license to practice medicine and safeguarding them in the practice of their profession, had a right, in return for the unusual protection thrown by the law around the profession of medicine, lawfully to require them to report PROMPTLY every birth as well as death occurring in their practice. A copy of this article was mailed to each of the physicians practicing in the state, and the objection to complying strictly with the law is gradually disappearing.

Of course, in some of the rural districts it is impossible to comply strictly with the law in filing certificates of birth within the time prescribed, but the rural physicians are making returns as quickly as possible. In the cities the law can be complied with, and the increase in the registration is gratifying, as is shown by the returns filed the first six months of the present year as compared with the corresponding period last year.

The registration laws require local boards of health to adopt and enforce local ordinances requiring compliance with the law. Some of the local boards have been active in enforcing such ordinances, the Board of Health, Town of Newburgh, in Orange County, recently having fined several physicians $25.00 for failing to comply with the law. One of our most active larger cities is Syracuse, where Dr. Totman, the efficient health officer, has been instrumental in having some 25 delinquent physicians and midwives taken to task for failure to observe the law.

In greater New York, where our friend Dr. Guilfoy is Registrar of Records, there is no hesitancy in prosecuting physicians failing to comply with the registration laws, and a fine of $100.00 is imposed in each instance.

Where a local board of health wilfully neglects to enforce the law, and the registration is incomplete, the State Commissioner of Health is required to send a representative to take charge of the local registration and correct existing defects, the expenses incurred thereby being a charge upon the municipality.

Of course it is difficult to obtain complete registration of births in some of our cities where there is a large foreign population, as in many cases physicians are not in attendance, and the midwives and parents, who in the absence of a physician are required to file the certificate of birth, are ignorant of the law, and also fail to realize the importance of a child's birth being recorded.

Some may say that the requirement that births be reported within 36 hours after the birth occurs, must result in a large number of incomplete records being filed, as many children are not named until some days after birth. While that is true, our law provides for the completing of such records, local boards of health being required to furnish physicians with a supplemental report blank which is to be left with the parents of children not named at time of birth, the blank to be filled out by the parents and filed with the local registrar as soon as the child is named. Upon receipt of the supplemental report, the local registrar enters the given name of the child upon his register and forwards the report to the State Department to be attached to the original return of the birth, thus completing the record on file in the Department.

There was a slight decrease in the reported birth rate in New York State last year, compared with that of 1908, but when we take into consideration the fact that there was a falling off in the marriages of over 20% in 1908, as compared with 1907, it is not surprising that there was a decrease shown in the birth rate in 1909, in spite of the fact that the registration of births in 1909 was more complete than in 1908.

With the constantly decreasing death rate we are experiencing, it is natural to expect an increasing birth rate, but it appears that the slight increase from year to year shown by the returns filed in New York State is due to the improvement in the registration, as undoubtedly there is a tendency to a decline in the birth rate. During the first six months of the present year there has been over 10% increase in the registration of births in the state, over the corresponding period of the previous year.

The percentage of increase in the cities above the New York State average is as follows:

Johnstown	55.2	Rochester	23.8
Middletown	45.1	Little Falls	22.8
Cortland	44.9	Glens Falls	22.4
Niagara Falls	37.1	Peekskill	20.7
Rome	36.8	N. Tonawanda	19.0
Watertown	36.4	Schenectady	18.9
New Rochelle	31.2	Newburgh	18.4
Plattsburgh	28.7	Olean	16.0
Hudson	26.0	Jamestown	15.0
Dunkirk	24.3	Albany	14.2
Oneida	23.9	Buffalo	11.3
State	10.9		

Thirty-seven cities in the state show an increase, and twelve report fewer births than for the corresponding period last year. The registration in these cities is at the present time being investigated by representatives of the Department.

It is most gratifying for me to be able to state that at the present time there is the most complete registration of births in the State of New York since the establishment of the State Department of Health in 1880.

The Massachusetts Association of Boards of Health

JANUARY—ANNUAL MEETING

Boston, Massachusetts

The annual meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, January 26, Vice-President Samuel H. Durgin presiding.

The following list of applicants, approved by the Executive Committee, were elected to membership in the Association:

R. B. Sawin, of the Brimfield Board of Health.
John A. Osgood, of the Lowell Board of Health.
Dr. James H. Drohan, of the Brockton Board of Health.
Dr. John J. Marlin, of the Beverly Board of Health.
Dr. John H. Tobin, of the Lawrence Board of Health.
Dr. George W. Gay, of Chestnut Hill, Newton.
Dr. L. Dionne, of Ware, Mass.
Dr. Clarence H. Staples, Bacteriologist, Malden.
Dr. Charles A. Reese, of the Wellesley Board of Health.
Dr. Ernest P. Fuller, of Lawrence.
Dr. George E. McPherson, of Attleboro.
Dr. Alexander M. Burgess, of Cambridge.

Dr. Kennedy. Are all those proposed for membership members of boards of health, or are some simply interested in health matters? Some have been admitted to this association in the past who are not members of boards of health, and I should like to know the policy of the Association.

Vice President Durgin. While in the first place designating as preferable members of boards of health, the Association, under its by-laws, has allowed also the admittance of others to membership who are not members of boards of health, but simply interested in health work. The constitution reads as follows:

"All persons holding appointments as members of a board of health in any Massachusetts city or town, the executive officer of such a local board, and the members of the state board of health, and such other persons as may be elected, shall be eligible to membership."

Report of Treasurer for 1910.

RECEIPTS.

Balance from 1909	$1,383.68
Annual Assessments	640.10
Interest at Savings Bank	53.04
Total Receipts	$2,076.82

EXPENSES.

Subscriptions to Journal and half-tone plates	$ 371.25
Stenographic reports of meetings	79.96
Clerical assistance to Secretary and Treasurer	34.25
Postage and printing for Secretary and Treasurer	95.43
Postage and printing for Committees	89.11
Cigars	22.50
Treasurer's Bond	4.00
Total expenses	$ 696.50
Balance to 1911	1,380.32
Total	$2,076.82

Of this balance to 1911, $1,339.75 is in the Central Savings Bank of Lowell, drawing interest.

Respectfully submitted,

James B. Field, Treasurer.

Examined and approved as correctly cast and properly vouched for,
January 23, 1911. J. Arthur Gage, Auditor.

Dr. Field. The Association made a better financial showing in 1910 than in 1909 and 1908. In the year just closed our annual dues fell short only $56.40 of paying our expenses, whereas in the two previous years the shortages were $133.73 and $118.32. With a lessened expense for postage and printing by special committees, we can prevent further encroachments upon our interest-bearing surplus. With the vicissitudes of the Journal in the past and the possible rulings of the Post Office Department in the future, we are safe only with an emergency fund to draw upon.

Nineteen hundred and ten shows the largest membership. Three hundred and twenty annual dues were paid. With a constantly changing membership, and a natural forgetfulness either to pay dues or to resign, it is

not strange that a lenient treasurer will carry upon his books for a few months a certain amount of dead wood in membership, amounting with us to about 7 per cent. of the total membership, and of course increasing our expenses in that proportion.

(On motion of Mr. Coffey the report was received and placed on file.)

On motion from the floor, a Nominating Committee of three, consisting of Drs. Emerson, Tobey, and Woods, was appointed by the Chair to nominate officers for the ensuing year.

The Committee on Milk Legislation desires to report that a large amount of proposed legislation bearing directly on milk is to come before the present legislature, and that such bills as are available, through already being in print, have been considered by the Committee. Some have merit, and others, from the standpoint of boards of health, should be opposed. No complete report is possible at this time, as many of the bills are not yet printed, but as soon as all are available the Committee will send a circular to all local boards of health, stating the attitude of the Committee on each bill.

George E. Bolling, Chairman.

(This report of progress was accepted and placed on file.)

REPORT OF THE COMMITTEE ON SEX HYGIENE.

During the past year, the Committee had reprinted its three leaflets for popular instruction on sex hygiene several times, and has distributed between ten and fifteen thousand of each of these leaflets. At the last annual meeting the Committee was denied any further appropriation from the funds of the Association, owing to the condition of the treasury, and at the same time was authorized by the Executive Committee to secure private donations to maintain its work and print these circulars. During the course of the year the Committee has received $242 from the sale of circulars and from donations, out of which it has spent $95.31, leaving a balance on hand at present of $147. The Committee has immediate need for all of this $147, and more, because it expects to receive a great many calls for the circulars, as a result of a circular letter which the Committee is just sending out. This letter, which includes the whole report of the Committee as it was adopted by the Association two years ago, has been sent to the city superintendents of schools in New England, to the district superintendents, to the high school principals in Massachusetts, to the hospitals and dispensaries which report to the State Board of Charities, that is, the legitimate hospitals and dispensaries in Massachusetts, and to the presidents of the colleges. Altogether about 1300 letters have been sent out, urging

upon the above-mentioned officials and institutions the adoption of our general program and the distribution of our circulars. We offer to send the circulars if they will distribute them, inviting them to pay for the circulars at twenty-five cents per hundred, if they wish to do so. Most of those using the circulars are willing to pay the printing cost, but the Committee will need probably more than the balance which it has on hand for the prosecution of its work.

The Committee wishes to renew its recommendations:

1. That the school authorities have judicious instruction given to grammar and high school students on sex hygiene.

2. That the State Board of Health be requested to ask all local boards to include syphilis and gonorrhea among the diseases to be reported to them as dangerous to public health.

3. That this Association request the State Board of Registration in Medicine to include the prevention and cure of syphilis and gonorrhea among the subjects of its examination.

4. That the State Board of Health be urged to send to all local boards of health, for distribution to persons having syphilis or gonorrhea, a printed leaflet or card similar to circular No. 2 of this Committee, setting forth the source, nature, and means of control of these diseases.

5. That every general hospital be asked to make provision for admitting to its wards cases of both of these diseases. We feel that it is much safer to have such cases treated in hospitals than to have them treated as at present.

6. That the State Board of Health laboratory and the local board of health laboratories make free bacteriological examinations for physicians of smears from the eyes of infants suspected of having gonorrheal ophthalmia, and of smears from the genito-urinary organs of persons believed to be suffering from gonorrhea.

The Committee reports with great satisfaction that during the past year the State Board of Health of Massachusetts has distributed to all physicians a convenient phial of nitrate of silver solution for use in protecting the eyes of new-born infants from gonorrheal infection. The first provision for the free distribution of such prophylactic was made by the Rhode Island Board of Health and was followed by the New York Board of Health, and since by Massachusetts, Ohio, and several other states.

The Committee suggests that the practice be continued until the next annual meeting.

Respectfully submitted,

LEWIS M. PALMER, M. D., Framingham, Chairman.
GARDNER T. SWARTS, M. D., Providence.
H. LINCOLN CHASE, M. D., Brookline.
WALTER E. KRUESI, Boston, Secretary.

(On motion of Dr. Washburn the report was accepted and the Committee continued for one year.)

REPORT OF THE NOMINATING COMMITTEE.

Dr. Emerson, Chairman of the Nominating Committee, submitted the following report:

For President, Henry P. Walcott, M. D.

For Vice-Presidents, Samuel H. Durgin, M. D.; C. V. Chapin, M. D.

For Secretary, James C. Coffey.

For Treasurer, James B. Field, M. D.

For Executive Committee, for two years: C. H. Eidam, M. D., Lawrence; F. A. Woods, M. D., Holyoke; M. U. Pierce, M. D., Milton; George E. Bolling, Brockton; H. L. Chase, M. D., Brookline.

(On motion of Dr. L. A. Jones, of North Adams, the Secretary was authorized to cast one ballot for the nominees of the Committee, and the nominees were declared the duly elected officers of the Association for 1911.)

MODERN BOARD OF HEALTH METHODS IN A SMALL TOWN.

By C. K. BLANCHARD,
Agent of the Board of Health of Wellesley, Massachusetts.

The problems met by the Board of Health of Wellesley, a residential town of about 7,000 people, are probably similar to those which arise in many other small towns of the state. The Wellesley Board of Health is composed of three members, each of whom, except the secretary, who receives a nominal salary, serves for three years without compensation.

Prior to June, 1909, five men were employed on a part time schedule. The members of the Board themselves gave their spare time to abating nuisances and to performing other similar duties. This organization was unsatisfactory, because much of the work was naturally performed in a perfunctory manner, and the system lacked co-ordination and intelligent direction. In the spring of 1909, some change being imperative, as an experiment, I was employed to do all the work of the Board.

To provide the necessary headquarters and facilities for work, an office and laboratory were established in one of the town buildings, and the equipment for simple bacteriological and chemical work was purchased. A microscope, incubator, and sterilizer, for the bacteriological work, and a balance and centrifuge for milk testing, together with the necessary glassware and reagents, completed the laboratory. These, with the usual furniture for an office and meeting room, cost about $300. The office is equipped with telephone service, and the various national and state health publications, as well as bulletins from cities in different parts of the country and from private sources, are kept on a reading table for convenient reference. The office is the central station from which physicians may obtain culture, sputum or blood outfits, vaccine, antitoxin, or silver nitrate solution at any hour of day or night. Opportunity is also afforded for incubating cultures at any time. The supplies mentioned may also be obtained at a sub-station in another part of the town.

The plan was to do the laboratory diagnoses for the local physicians for diphtheria, tuberculosis, typhoid fever, and malaria; to test milk for fats and solids, and, to some extent, make bacterial counts. This plan has been followed from the start, and, we believe, with satisfactory results.

Last year the following work was done at the laboratory:

Cultures from nose and throat	63
Sputum examinations	19
Widal tests	5
Blood examinations for malaria	4
Chemical milk tests	119
Bacterial counts for milk	5

The office hours of the agent, from 8:30 to 11 A. M., allow time for laboratory and office work, receipt of communications, and similar routine. The remainder of the morning and the whole afternoon are devoted to visiting quarantined premises, placarding and disinfecting for communicable diseases, inspection of plumbing, inspection of dairies, markets, etc., investigating complaints, or superintending the collection of garbage. As we have had very little trouble in securing reports of contagious diseases, except in cases of measles, it is seldom necessary to examine suspicious cases where no physician has been called. When necessary, investigation is made by one of the physicians on the Board of Health.

The present system has many advantages. The value of regular office hours and prompt attention to business is obvious. There is decided gain in the co-ordination of all parts of the work. The one who diagnoses a case of diphtheria also placards the house, gives directions for the quarantine of the patient and sees that they are carried out, examines the release culture, and, finally, disinfects the house and issues the permit for the child to return to school. Again, the collecting and testing of milk samples and the inspection of dairies is done by a man familiar with the conditions under which all the milk is produced, and personally acquainted with the producers themselves. The system also results in a marked saving of time by allowing the Board to devote its limited time to deciding important questions.

It is well understood that the great need of today in public health work is education. We cannot expect support from citizens who have little or no conception of what we are trying to do, nor can we hope to reduce greatly communicable diseases until the public have some intelligent idea of infecting organisms and means of guarding against them. For the purpose of spreading the knowledge of these subjects, we believe that a trained agent or health officer would be of great value to a small town. But the question may arise, "Why should not the physician of the Board attend to this?" Unless he is the only physician in the town, there would be serious objections to his visiting all contagious cases. It is hardly necessary to say that he must consider his own practice first and

use great discretion in his public service; whereas, a person having no practice to consider may act in each circumstance solely as the representative of the Board of Health.

With a person giving his whole time to the work, it is possible to do not only a greater amount of work, but also more varied kinds of work than could otherwise be done. For example, inspections of all kinds, frequent visits to quarantined premises, close watch of possible nuisances, general supervision of the sanitation of a town, could be cared for instead of carrying out merely the duties imposed by law or by clamorous public opinion.

There are, of course, disadvantages in this system. A man cannot be a specialist in all branches of Boards of Health work—in laboratory diagnosis and plumbing inspection, for instance, he will not have the skill or experience that is secured by employing different persons, each trained in his own department, and giving his whole attention to work of one kind. A decided disadvantage in the minds of some taxpayers would be any increase in expense. Unquestionably, if the whole time of a man capable of doing the diagnostic work and the chemical and bacteriological milk tests is to be secured, the cost will be greater than the appropriation made by some towns. In Wellesley, however, with the exception of the amount expended for laboratory equipment, the cost of the year's work in 1909 under the new system was approximately the same as if the old methods had been retained, or about $1100. The figures for 1910, computed on the same basis, seem less favorable, being roughly $1100, if the old system had been retained, as against $1500, the actual cost. It should be remembered, however, that this comparison is not a just one, as a great deal of work was done that would not have been undertaken with the old methods and a smaller appropriation.

It is not my intention to suggest the system of administration just outlined as applicable to all small towns or even to all large ones. But there are doubtless many towns in the state where the system, with a few changes, could be used to advantage.

In conclusion, I should like to suggest a modification of this system, which seems practicable, and which, if adopted by the smaller towns, would increase the efficiency of health department work throughout the state, without calling for greatly increased appropriations. This could be accomplished, I believe, by the Boards of Health of two or three adjoining towns combining to secure the services of one or two trained men, who would carry on the work of the towns much as the agent does in Wellesley. Combinations of this kind are especially provided for in the laws relating to hospitals for contagious diseases and inspection of plumbing, and are in accord with the movement for efficiency everywhere.

Two men might be employed to advantage in such a system; one a bacteriologist and chemist, or a sanitary biologist, to direct all work, attend to office and laboratory duties, and take charge of the enforcement of quarantine, while the other would do the inspection work, investigate nuisances, collect milk samples, and perform similar duties. This would form an efficient administration, and would give excellent service at small expense for each town. Each district would have its laboratory where diagnostic and analytical work could be done quickly. At the same time each town would keep its individuality, have its own Board of Health, and conduct its affairs as now. Such a plan would be especially advantageous in a small town where the Selectmen are the Board of Health, or where the members have but little time to give to their duties.

This method would also perfect the organization of health work throughout the state. With the State Board of Health having general charge, with State Inspectors in charge of large districts, as at present, and sanitary biologists in charge of the actual work in the cities and from one to three or four adjoining towns, but working under the direction of the local Boards of Health, the organization for the care and control of communicable diseases, for securing clean milk, clean conditions under which food is handled and sold, and sanitary conditions throughout the state should be more complete, efficient, and practicable.

MODERN BOARD OF HEALTH METHODS IN SMALL CITIES.

By SELSKAR M. GUNN,
Massachusetts Institute of Technology, Boston.

As the time at my disposal is insufficient for a discussion of all the problems that confront the Boards of Health of small cities, I shall content myself with some remarks on certain important phases of the work.

It is rather difficult to define what is meant by a small city, but, for the purpose of this paper, I am going to consider as such, those communities with a population of from about ten to fifty thousand. It was my good fortune to serve as health officer in a city with a population of approximately 27,000 for nearly two and a half years, and I hope that some of my experiences and reflections may be of interest and value.

The history of the subject has demonstrated that most of the real advances in sanitary science and practice have arisen through the needs of large cities. In great cities, the magnitude of the insanitary conditions, combined with the immense amount of preventable sickness and loss of life, have commanded the attention of health authorities and have given rise to the inauguration of steps to attempt to offset the evil conditions of environment, or the serious results of ignorance, which have largely caused these dire results. The smaller cities in many parts of the country have only recently commenced to arouse themselves from their lethargy and to realize that the problems of the large cities are theirs also, though on a reduced scale. Many small cities, unfortunately, have not yet awakened from their sleep, though I think we may take pride in saying, that, in general, the small cities of this commonwealth cannot be truthfully included in this group.

It might seem unnecessary to state that the first essential for a Board of Health of any community is to have sanitary rules, which are up-to-date, but yet within the legal limitations. We oftentimes would like to adopt new rules, but we must not let our enthusiasm carry us to the point of passing regulations which we cannot legally enforce. Many health departments do some of their work on "bluff." It is a poor policy in the long run, even if it may at times bring results.

The second essential is, of course, to have adequate means of enforcing the health code. This necessitates, first, a staff of trained workers who should be adequately recompensed; second, the maintenance of a suitable office for the proper keeping of records and where someone can be found

at reasonable hours to answer questions, issue permits and respond to emergency calls; and, finally, the necessary equipment of disinfecting apparatus, sample cases, and the general apparatus for chemical and bacteriological analyses. Too frequently we find the health department —the most important office in the city—housed in a miserable room and presenting anything but the appearance of a modern city office.

Modern practice calls for the care of all records of vital statistics to be in the hands of the health department. This provision is essential as far as records of deaths and births are concerned; and perhaps the time will come when marriage licenses and certificates will also be generally looked after by the Board of Health. The modern practice, imperfect at the present time where in force, of demanding certificates of health from prospective brides and grooms, makes the health department the natural place for the issuing of licenses and the filing of certificates.

Vital statistics are recognized as being a valuable aid to sanitary science. If scientifically applied and interpreted they can be used as an instrument for measuring the sanitary status of a community, and they can be made to point out the weak spots and thus to indicate where special efforts should be directed. They can be used to measure improvements in the health of a community by indicating decreases in the number of deaths or cases of preventable sickness. We must always remember, however, that if they are inaccurately and unscientifically used they may be literally worse than useless. A campaign against infant mortality, for example, would be lacking in its greatest aid if the statistics of infant births and deaths were not available and made use of. It is a surprising fact that many boards of health of small cities do not control these important records, which they naturally should do.

The whole problem of nuisances seems to call for some comment on account of the attention that is given to them by health departments. It is perhaps hard to imagine a condition when nuisances shall no longer be dealt with by boards of health. Sanitarians are realizing more keenly every day that the vast majority of nuisances that take up so much time do not affect the public health, or, if so, in an inappreciable manner. This is particularly true in those small cities which are fortunate in having a good water supply and sewerage system, thus obviating the privy, the leaky cesspool, and the resulting polluted wells, which are, of course, nuisances of real sanitary import.

Nuisance work is largely police work, and, in my opinion, should be performed by individuals primarily connected with the police department, so that the health officer and his assistants may be able to devote their time to real questions affecting the health of the city, and not to the

inspection of dumps, ash heaps, dirty cellars, weeds, noisy phonographs, cackling hens, and the like. The modern trend is to make the plumbing inspector responsible to the city engineer, and this is as it should be. Perhaps we may yet see the nuisance inspectors put under the city police department and granted the full police powers so often lacking to the sanitary inspector, and, therefore, there may be greater efficiency in doing away with conditions that are distinctly objectionable but not necessarily unhealthful.

A few words with regard to modern practice in combating tuberculosis. It is becoming recognized more generally that the most important factor in helping to decrease this disease is the segregation of the patients. We must have better facilities for the hospitalization of our consumptives, particularly for the advanced cases, which too frequently are neglected in our enthusiasm and desire to cure the incipient cases. We simply must remove the advanced cases to a safe place, if we are going to cut down the incipient cases. We need greater authority to deal with the careless consumptive who jeopardizes the health and lives of those living near him.

I note in some board of health reports of this state, comments on the difficulty of obtaining reports of cases of this disease. My own experience in Orange, New Jersey, may be of interest in this matter. The Board of Health of that city in 1905 placed tuberculosis on the list of reportable diseases. In 1906, thirty-eight cases were reported and seventy-two deaths; in 1907, forty-one cases and sixty-eight deaths. On my assuming the health officership in March, 1908, I noticed the great discrepancy between the number of cases reported and the number of deaths registered. I sent out a courteous appeal to the physicians and made a point of following up all tuberculosis deaths that had not been reported as cases previous to their death, in order to find out the reason for the neglect, and I was able in that year to increase the number of cases reported to 116, and in 1909, to 127. It is now a very rare occurrence to receive a death certificate with tuberculosis given as the cause of death, where the case is not already on file in the office and the circumstances of the case known. We well know that one of the great difficulties in the tuberculosis problem lies in the fact that it is a hard task for a board of health with limited help to follow up the cases and keep track of them as they move from one part of the city to another. I made an arrangement with the local Anti-tuberculosis League to permit the board of health to appoint their visiting nurse as a sanitary inspector, her salary being paid by the League. This gave her the necessary authority to visit all cases which we considered it necessary to watch and made her an important figure, on account of her official badge, particularly in the eyes of the foreign

element, who were thus more apt to do what she told them. A tactful, gentle woman can frequently be of great service in persuading dangerous advanced cases to follow out directions in the home that will tend to minimize the dangers to those living in the same house or tenement. Not infrequently she can induce cases to go voluntarily to hospitals where they can be absolutely controlled. Incipient cases can likewise be urged to go to sanatoria, and day camps; and, not infrequently, the nurse can find other cases, perhaps in the children, and get them to go to a dispensary or elsewhere, for treatment. Finally she can see that a proper diet is obtained, where poverty prevents, by bringing the case to the notice of the diet kitchen, milk depot, or other private social agency in the community which may be doing such philanthropic work. Many of these organizations are not doing the effective work that they are capable of, because they are not in a position to discover the cases which they really should be assisting. They have oftentimes to take the cases as they come, irrespective of the real need, and so many who most need help are never reached.

All of this emphasizes the important fact that in small cities, the health department should co-operate in every way possible with all the private social agencies that are at work in the city. These agencies are not infrequently doing work that properly should be done by the health department, but which, through the parsimony or false economy of the city fathers, cannot be undertaken at the present time. Anti-tuberculosis leagues and milk depots are examples of this.

A sanitary inspector, if he is wide awake, will discover cases of destitution and distress which, although out of his province, should be referred to the local Bureau of Associated Charities for assistance. My own experience has shown this to be the case on many occasions. The visitors of the charity organization, too, find conditions that come within the province of the health department. Under such circumstances, a mutual feeling of good-will will be an important factor in efficiency. Too frequently we find the health department at loggerheads with the local private social agencies, or *vice versa*. There may be good reasons on occasion, but if a proper spirit of harmony exists, the health department will find valuable coadjutors in these organizations who may be of great value and influence, when it comes to questions of getting the proper appropriation for the board of health.

There is one subject which is a very important factor in health conditions that I fear is not getting the attention that it deserves in small cities. I refer to the housing problem. Many of our small cities at the present time have bad housing conditions—not only bad occupancy but also

bad construction. The great problem is perhaps not so much the eradication of existing insanitary conditions, necessary as this is, but the enactment of proper legislation which will prevent the erection of buildings that will be the despair of succeeding generations of health officers. It may be more dramatic to carry on a vigorous campaign against existing bad housing conditions than to advocate legislation to arrest this growing evil, but the latter method is really truer prophylactic work and worthy of the attention of boards of health. It seems to me that the time is ripe for concerted action, in order to obtain state legislation that will make it impossible for small cities to have overbuilt and insanitary areas of dwellings erected within their limits, and I offer this suggestion for careful consideration.

Time does not permit my referring in detail to modern methods of safeguarding the food and milk supply. The boards of health of this state, as evidenced by their reports, are, as a rule, making headway with these important problems.

Score cards for dairies and milk depots are being used more extensively from year to year, and, despite criticisms, they are, in my opinion, useful agents in bringing about improvements. It is to be hoped that a card may soon be available that will be sufficiently satisfactory to be generally adopted. At the present time there are various cards in use, and it is difficult, if not impossible, to compare the results of scoring in one city with those of another. Score cards are being used in a few places for stores, butcher shops, groceries, and vegetable stores—where all kinds of food are sold.

An excellent scheme is in use in a very few cities where inspection cards are given to all inspected stores in which the sanitary conditions are up to the standards of the board of health. I am told that it is a great incentive to stores that fall below this standard to improve, so that they can pass the inspection satisfactorily, and thus be able to display their cards. Constant re-inspection is, of course, essential in such a scheme. Barber shops and laundries can also be treated in the same manner.

I should like to say a few words with regard to the subject of annual reports of the boards of health of small cities. Last summer Mr. Maurice Scharff, of the Institute of Technology, at my suggestion sent out a circular letter to the boards of health of all cities whose population was estimated by the Census Bureau in 1908 as between twenty and fifty thousand, asking them to send him a copy of their 1909 report. He sent out one hundred and seventy-five letters and received seventy-seven replies—ninety-eight making no reply. Thirty-nine of the replies were in the form of an annual

report; three sent monthly reports; and ten sent letters to say that the 1909 report had not yet been printed (Aug. 1, 1910). Twenty-five wrote that they issued no report.

Mr. Scharff kindly turned these reports over to me, and I have obtained others independently, so that I have had an opportunity to look over 56 annual reports. Twenty-five are reports of small cities in Massachusetts, and it is easily seen that the Massachusetts reports are on the average more satisfactory than the reports of less enlightened cities in other states.

The value of an annual report is readily seen. The preparation of it is a good thing for the health officer. He has to stop and go back over the year and see what he has done to improve the sanitary condition of his city, and the mere fact that his work has to be published, and the report is to be circulated in the city, is an added incentive to him to make a good showing.

The wide divergence of method in drawing up these fifty-six reports examined has appealed to me. There is a great lack of uniformity—a very desirable quality—and in the majority of these reports, little evidence of any general plan. We should recognize that the reports are not merely for the information and use of the city in which they are issued. A good report has a field of greater usefulness. It enables others to see what methods we use and the results that we obtain, and we too can secure benefit by the examples of others as shown in these reports. We do not pay enough attention to the reports of other health officers and do not reap the benefit of their experiences or give them the benefit of our own.

You may be surprised to hear that in twenty-four of the fifty-six reports there is no hint made of the population; this omission was found in 13 out of twenty-five reports of Massachusetts cities. The methods of recording vital statistics are too numerous to mention. In the matter of mortality statistics, all kinds of classifications of deaths are used, the alphabetical method being the most common. It is a sad commentary on the intelligence of a registrar where we find phthisis and tuberculosis classified separately, phthisis in the "p's" and tuberculosis in the "t's". In one report there were recorded 6 deaths from phthisis and 37 from tuberculosis, and there were other examples of a similar nature, where certain diseases having several names were recorded as being apparently entirely separate and distinct.

The standard International Classification, or Bertillon System, was found in 10 out of the 56 reports examined. Modern methods demand that this classification shall be used in all instances.

Birth and infant mortality statistics were, with a very few exceptions, entirely omitted. The omission of birth records is of course easily under-

stood in southern and western cities, but not so easily in states where the birth returns are more or less complete and accurate. In only a few of the reports examined was I able to find statistics of the number of deaths under one year per 1000 births, or any other statistical information that would give a satisfactory measure of the infant mortality.

Financial statements of the expenses of the health departments were found in 32 instances. We must tell how much, or perhaps too often how little, we spend—other cities need this information. Salaries are usually lumped together. In sixteen instances the salaries of the various employees of the Board were given. They should always be given in detail. We should let the public know how little we pay our health officials.

Time will not permit my going into many other discrepancies. It seems to me that this whole matter is worthy of the attention of this Association. Might it not be a good plan to appoint a committee to consider the possibility of drawing up a standard form of report for boards of health of this state, giving all the necessary liberty for the discussion of purely local problems? There are certain facts and figures that should be given in all health reports.

It should be impossible to read, as in one report, that "out of 22 cases of contagious and infectious diseases reported there were only three deaths" and then be able to turn over two pages and find a table of the causes of death, with 4 deaths from diphtheria, 7 from typhoid fever, and 10 from pulmonary tuberculosis.

A final consideration, but an important one, is the vital question of education. Sanitary science has advanced markedly in the past few years; and to my mind one of the greatest advances consists in the recognition of the fact that it is PERSONS rather than THINGS that are the chief cause of the spread of infectious disease. Contact infection is coming to be considered the most important method of infection, and in order to combat infection from this source, we must have an increased knowledge of what clean living really means. This can be accomplished only by education, and progressive boards of health must constitute themselves into an unofficial educational body and use all means to spread the gospel of sanitary living. Those in actual charge of the education of our children must be made to realize the importance of the proper teaching of hygiene in the public, parochial and other private schools. The newspapers and the lecture platform can likewise be used to great advantage. We have a number of examples of such educational campaigns being carried on in different cities in the United States. In many places circulars on many topics of sanitary significance are also now issued and distributed broadcast.

The boards of health of the small cities of Massachusetts, in some respects, are already leading, but it is possible for them to make still greater advances. If we are agreed that we need better housing laws, better methods for combating tuberculosis and infant mortality; if we are agreed that uniform methods of recording our work and its results are to be desired; then we can work together to overcome the difficulties that beset our path. The task is a big one, but let us remember that it takes concerted and co-operative effort to move heavy obstacles. In this state, there is no better or more direct way of accomplishing these ends than through the efforts of this Association.

DISCUSSION.

On motion by Mr. Kruesi it was voted to authorize the Chair to appoint a committee of five to undertake to secure uniformity in board of health reports. The following appointments to this committee were subsequently made:

Dr. C. V. Chapin, Providence Board of Health (Chairman).
Mr. S. M. Gunn, Massachusetts Institute of Technology.
Dr. F. G. Curtis, Newton Board of Health.
Dr. Wm. C. Hanson, Asst. Sec. State Board of Health.
Dr. Wm. H. Davis, Vital Statistician, Boston Board of Health.

Professor Sedgwick. There is one suggestion in Mr. Blanchard's paper that is worthy of the careful consideration of the Association and of all persons interested in public health administration, and that is a way of getting over the inability of the small town to meet the necessary expense of modern board of health work. The idea arose, I believe, from a consideration of what is oftentimes done to secure efficient superintendents of schools. Some of you are aware that where two or three poor towns—poor in purse alone—are unable to keep an expensive superintendent of schools, they may combine and secure a superintendent in common. Mr. Blanchard, in his paper, threw out a similar suggestion, and I do not see why the method might not be made to work just as well for board of health matters as for school matters. It was suggested that two or three adjoining towns might combine, and by pooling their interests, be able to afford a really good health officer. This could readily be done, unless each town demanded that its health officer be a resident. Massachusetts has led in many things; it has led in the district medical officers of health; it was certainly one of the leaders in this educational policy that I have spoken of—possibly the first; and it might, it seems to me, lead along this line which Mr. Blanchard has suggested.

Professor Rosenau. This subject would not be complete if at least one phase of it were not brought to the attention of this Association, and that is the leadership in public health training which the Massachusetts Institute of Technology has had through the leadership of Professor Sedgwick, head of the department of biology in that splendid institute. I would emphasize the influence which Professor Sedgwick and that department and that great school has had, in the development of public health conditions in this country, and, particularly, the influence which Professor Sedgwick and his pupils have had in the education—and I

might say the formation—of health officers, who have gone to a number of smaller cities where they have done splendid work. I think Professor Sedgwick and the Institute should be congratulated upon the splendid record they have made.

Mr. Ritchie. In the paper that Mr. Gunn presented there was a corroboration of a bit of statistical work on infant mortality undertaken by me while with the Boston Board of Health. It is perfectly easy to secure statistics on infantile mortality—infants dying below the age of one year—in any of the well-organized European towns. In the United States it is possible to get a rate per thousand births of the infant mortality in less than ten of the cities. The suggestion, therefore, that the statistics of infantile mortality be looked over with the greatest of care is a vital one. Sanitarians look to an improvement in the vital statistics, to a lowering in the death rate, by saving babies more perhaps than through any other one department of their work. The babies cannot be saved until we find how many are being lost, and why. Therefore, gentlemen, may I impress upon you the need of some way of determining the infantile mortality per thousand births in this country?

Dr. Kelly. My practice extends outside of the city of Fall River into districts which are under the jurisdiction of the boards of health of small towns who are working without pay, and my experience has been that any man who works without pay does not do work of much account. Mr. Gunn made the remark that it is a good thing to publish statistics showing how little boards of health receive as compensation. Even were this done it would probably be said that their compensation was sufficient, and they were being paid all they were worth. Some system should be established whereby communities would be made to realize the value of the men who act as boards of health in towns or cities. The way to impress upon the people in the country the fact that they have boards of health is to pay the boards of health, and pay them what they are worth. They pay the policeman, the school teacher, and the clergyman, but they don't pay the board of health. Qualified men are needed for health work just as much as they are needed for the positions just mentioned, and there should be some provision made to pay for services. When the people have to pay for public health work they will be more particular to see that men are secured who will attend to their duties.

Dr. Dionne. I consider some of the suggestions made by the speakers as practical, even in a small place. I am representing the Ware Board of Health. Though Ware is a little town of only 9,000 inhabitants, this

municipality has been able to pay its health officer as much as $25 a year. Out of an appropriation of $1600 we have a milk inspector whom we pay $200 a year, an inspector of carcasses at $200 a year, and a sanitary inspector, who is our disinfector, and who is also paid $200. We have appointed a physician as inspector of the parochial school out of our appropriation, since that is about the only way we can reach the parochial school through the boards of health, as there apparently can be no money taken from the grand list.

From one of our drug stores, serum for the treatment of meningitis can be secured by the physician without cost. We have recently notified physicians that in all cases of syphilis, 606, so-called, would be furnished by the board of health. In all cases of infantile paralysis our department of health directs that the house be placarded and that the patient be isolated for a period of six weeks; that other members of the family be not quarantined, but other children in the family be kept from school for six weeks after the beginning of the last case in the family; that disinfection be carried out; and that in case of death no public funeral be allowed. Our infantile paralysis cases have been investigated by Dr. Shepard, and I am pleased to say that we have received compliments upon our way of handling them. I simply wish to show you that in small towns these things can be accomplished.

Mr. Blanchard. In order that garbage may be kept and handled in a proper manner, we have had a card prepared which the driver of the garbage wagon gives out, when he finds places where garbage is not properly taken care of. This card is signed by the Board of Health and politely requests the occupant of the house to change conditions. Copies of this card and of our other forms will be furnished on request.

Dr. Palmer. I move that the papers on today's program be printed under the direction of the publication committee, marked in some way approved by them, and sent to all boards of health, so that all may reap the benefit of these papers. (Carried).

Professor Sedgwick. Simply as a matter of information, I may say that it is an interesting and inspiring fact that the medical profession today welcomes the addition of lay members to its work, and invites their co-operation. It is one of the finest signs of the times, it seems to me, and one of the most welcome to the laity. To show that such work as has been described can be done by such men as the readers of these papers, and by others like them, I may say that at the present moment men like these are health officers or sanitary officials of Palo Alto, Cal., and the boards of

health of Montclair, Elizabeth, Orange, Summit, and Hackensack, N. J. Until very lately there was one also in Plainfield. Good work, then, is being done for public health in many directions, by physicians, who have always stood for public health movements, and who by their latest measure—the creation of a course at Harvard Medical School leading to a degree of Doctor of Public Health, are preparing to train men for public health service on the higher levels, not only for small towns and small cities, but for the biggest towns and the biggest cities. It is now possible even for a layman, to obtain at Harvard University, the degree of Doctor of Public Health, while for a medical man it is comparatively easy. This, in my opinion, marks an immense step forward, a step for which Harvard University and especially Professor Rosenau ought to receive, and will receive, I am sure, our warmest thanks.

THE RELATION OF ILLUMINATING GAS TO PUBLIC HEALTH.

By W. T. SEDGWICK and F. SCHNEIDER, JR.,
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In 1792, one William Murdoch, in his little house in Cornwall, for the first time in the history of man, lighted a house with illuminating gas. Shortly after that some of the manufacturing establishments of Manchester, and notably the great engineering establishment of Boulton and Watt (he of the steam engine) were likewise lighted by illuminating gas—a gas made by the destructive distillation of bituminous coal, for distribution through these shops in pipes. Lighting with gas, however, did not grow very rapidly in popular favor. In 1810 it was introduced into some parts of London, in 1820 into some parts of Paris, in 1821 into Baltimore, in 1822 into Boston, and in 1823 into New York; and yet so slowly did this new practice develop that Dr. John Collins Warren, in speaking the other evening about the introduction of illuminating gas into Boston, said that his father, when he went to occupy a new house on Park street, occupied the first house in Boston to be lighted by illuminating gas—and that was in 1845. So that this introduction of gas in 1822 must have been into the streets, public buildings and the like. By 1855, however, virtually all of the cities of Massachusetts had illuminating gas distributed. During the Civil War the distinguished and beloved founder of the Institute of Technology, Professor William Barton Rogers, afterward President Rogers, was appointed by the war governor, John A. Andrew, as the first state inspector of gas meters and gas in the United States, and the first, of course, in Massachusetts.

In those days there was no idea that there was any connection between illuminating gas and public health. President Eliot's father published an important paper in 1855 on illuminating gas, and said nothing, or next to nothing, about its relation to public health, and, as I have intimated, no gas inspector was deemed necessary until during the period of the Civil War, and then not mainly on sanitary grounds. The use of gas, however, grew apace, and it was produced by the same process of manufacture until about 1870, when a new process was invented by a Frenchman, perfected by an American and patented by the latter, I think, in 1874. It was a process of making illuminating gas not by the destructive distillation of bituminous coal, but by passing steam over incandescent coal or carbon of some

sort, under which conditions the steam or water was decomposed, so that hydrogen and carbon monoxide and some carbonic acid and traces of other gases came off at the top of the retort, the gas being non-luminous, but called, because it was made from steam in this way, water gas. It became necessary, of course, to enrich it for illuminating purposes, and it is still so made and so enriched by oils or naphthas, and is the gas which we are today using in whole or in part in most of our cities.

By 1880 it had become a rather common practice to make water gas, and a corporation desiring to compete with the old Boston Gas Company and the other gas companies of this state held the water gas club over the owners of the old gas companies and their stock, telling them to surrender at a low price or they would manufacture water gas and put them out of business. The owners of the old gas companies, however, were unwilling to hold up their hands and surrender without a fight. They accordingly employed the sanitary club which has been so often used, rightly or wrongly, in public and political affairs, and secured the passage of a law providing that no illuminating gas containing more than 10 per cent. of carbon monoxide should be manufactured and distributed in this state. It was believed that the new gas was very poisonous, and it was comparatively easy for the old gas companies, with all their influence, to get the law passed, and the plans of the invading corporation were temporarily checked.

A battle royal was then fought by the owners of the water gas patents, who hated to see their favorite gas put under a ban or prejudiced in any way in popular favor, either in this state or elsewhere, and who were fearful that a prohibitive law might be put in force in other states, as well as in Massachusetts; although, as a matter of fact, there was little danger of that. In 1884 one of the largest arrays of legal talent ever gathered was seen in the state house, with Mr. Richard Olney at the head of the old gas companies and Mr. Robert M. Morse at the head of the water gas interests. The State Board of Health, Lunacy, and Charity, as it was then called, was drawn into the controversy, and in 1883 requested my distinguished and lamented colleague, Prof. William Ripley Nichols, to take up an investigation of the sanitary qualities of the new gas and compare them with those of the old. I had just come to Boston at that time from the Johns Hopkins University, and Professor Nichols invited me to join him in this work.

We set to work very carefully, Professor Nichols doing the chemical work and I doing the physiological experimentation upon animals. We made an elaborate series of investigations, partly in a barn which I had modified for the purpose, in Newton Centre, where I then lived, partly in Athol, which was illegally using the new gas, and partly in Middletown,

Connecticut, where Professor William O. Atwater, the distinguished food expert, an old friend of mine, kindly gave me the opportunity to experiment. In 1884 the results of our experiments were published, and they bore heavily against the new gas. The results, briefly, were these: If in a room of 800 cubic feet—a small hotel bedroom—the gas should be let on during the night from one or more burners, the chances were good that if the gas were the old-fashioned gas—the coal gas, so-called, whoever was in that room would be taken out in the morning with a bad headache and feeling very dull and stupid, but still alive; whereas, if the gas were water gas, he would almost surely be taken out dead. This report was based on the results of our experiments upon animals, and we made enough experiments to be sure of our ground. We further predicted that if the law should be repealed, and water gas introduced into this state, the deaths from gas poisoning would increase enormously.

The sanitary club which our report constituted enabled the old gas companies to hold off the water gas company until they received their price. Then the sanitary club was laid on the shelf and forgotten, and all hands, old and new, united in the repeal of the old law because it interfered with business. In 1890 the law was repealed, with what results we propose to show you this afternoon.

One of the by-products of this agitation, and a good by-product, was the formation of a commission, known as the Gas Commission, afterwards changed to the Gas and Electric Light Commission. One of the good, sanitary things which they were required to do was to keep track of the injuries from gas poisoning and to report them annually. That they have done from that day to this. When the medical examiner system came into vogue we had a body of trained medical men who investigated deaths from gas poisoning, and investigated them intelligently. We have two sets of reports, therefore, upon which we can base our statistical studies—the medical examiners' returns, and the returns of the Gas and Electric Light Commissioners. Mr. Schneider and I have found those of the medical examiners somewhat more dependable and have chiefly used their reports.

It was twenty-three years ago when this commission was appointed, and we began to get our statistics, and twenty-four or twenty-five years ago since I became interested—intensely interested—in the subject. I have spoken to this Association more than once upon this subject, but after the lapse of twenty-five years it seemed to me well to go back and see what Professor Nichols and I said, and how the facts have borne out our predictions. On looking over the results I feel in some respects very well contented. But apart from those considerations, Mr. Schneider and I were surprised, shocked, and astounded, by the extent to which illuminating

gas poisoning is going on in this state and in other states, for it is not merely, or even chiefly, in this state.

In Rhode Island, in New York, in Pennsylvania, and elsewhere, but especially in the northern tier of states, gas poisoning is today a very serious cause of sickness and death; how serious may be judged by the following facts: The rate per 100,000 in gas poisoning in this state and in Rhode Island is now quite comparable with that of scarlet fever in some years, and measles, in others. For example, in 1905, in Massachusetts, the rate for measles was 5.9 and for scarlet fever 3.9, both of which figures are exceeded by some of the figures for gas poisoning. In 1909 the rate for measles in Massachusetts was 4.76 and that for scarlet fever 7.86, figures again either exceeded or approached by the statistics of deaths from gas poisoning. As for infantile paralysis, about which we hear so much, gas poisoning is a far more serious cause of death today than that is, and ought to be taken account of correspondingly. It is not so alarming, because we know more about it. We are always alarmed by the things that we don't understand; we are apt to be too little alarmed by the things with which we have become familiar. Let us compare gas poisoning with a disease like typhoid fever. Typhoid fever in Cincinnati this last year reached the rate of only 5 per 100,000. In Hamburg, Germany, it has been 4 and 5 per 100,000 for some time. In other words, more people are dying of illuminating gas in Rhode Island and Massachusetts than are dying of typhoid in Hamburg, and in many other places.

Our figures begin with 1886, because previous to that time no adequate records were kept. In 1885, Dr. S. W. Abbott, speaking upon the relation of illuminating gas to public health, said that there were more deaths from illuminating gas poisoning in the first year after the law was repealed than there had been in the previous fifty years in the state of Massachusetts.

Mr. Schneider has very carefully worked out from the reports of the Gas Commissioners, the total amounts of gas made in the state. It must be remembered that there are many people in the state who get no gas. There are some companies which chiefly make water gas, and some which chiefly make coal gas, but most of them today mix the two, the water gas being quicker to make and in many ways a great help to the gas manufacturer. The actual cost of coal gas and water gas today is said to be just about the same; sometimes one is a little more expensive, sometimes the other.

The deaths from gas increased very quickly after the repeal of the law in 1890, reached a high maximum in 1898, fell off very suddenly to 1901, and ran up again to its very high position in 1908. In 1901 the New England

Gas & Coke Company, a coal gas corporation, was established in Everett, and began introducing vast quantities of coal gas into the total output, so that the water gas made in that year fell off.

During the year 1901, while the number of suicides from all methods rose, deaths from gas poisoning were very low.

Another very interesting point is the seasonal distribution of gas poisoning. Of course, less gas is used in summer than in winter. The days are long, the nights are short, the windows are wide open. Suicide is less frequent in the summer. The high points of suicide, as we should see if we had the seasonal curve, are in April and October, and in summer the whole number of deaths is small.

This total number of deaths by gas poisoning is divided into accidental and suicidal, as indicated by the medical examiners. Accidental and suicidal deaths run about half and half, according to their returns. It is often a fine point to determine whether a case is accidental or suicidal.

This matter of suicide by gas is very important, and not to be passed over lightly. We make it difficult for people to get morphine and certain other poisons, but we make it very easy for them to get illuminating gas, and then fill the newspapers with accounts of gas poisoning, suicidal and otherwise, which influence the mentally unbalanced. Thus it is a fact that gas has become a very popular suicidal agent—how popular, you will see when you realize that about one-half of the high death rate from gas poisoning is suicidal. Accidents reach their highest point in December, because the days are short, the nights long, the windows closed—the gas is used early and perhaps blown out or left to go out early. All things thus conspire to make the cases of accidental gas poisoning numerous at that time; but gas is not so much used for suicide then as later.

It is possible to have deaths from gas poisoning with no gas pipes in the house. A house in winter, as you know, acts as a chimney, the heated air rising and sucking in the ground air. Those cases are common and well known to students of this subject.

From newspaper clippings, we can cite various ways by which gas poisoning has occurred. Sometimes an animal like a rat or a cat, running by a cock on a gas stove, will open it, as is stated in one of these cases. Sometimes people will blow out the gas. But the quarter-in-the-slot meter is today responsible for a large number of deaths. In a recent case, robbers broke a slot meter to get the money, whereupon gas was let into a house, and a large number of people had their lives jeopardized, and some were killed.

It is fair to say that in the fifty years preceding the repeal of the law regulating the amount of carbon monoxide in gas, there were not half a

dozen cases of gas poisoning outside the two or three where the gas was being used in Massachusetts in violation of the law. Since that time it is safe to say that there have been at least 1200. Is not that a pretty high price to pay for the convenience of manufacturers?

The remedy is the return to the use of the old-fashioned coal gas, which is still used in many places, and which by the testimony of gas men is not much, if any, dearer than the water gas, but which is much less convenient to make. It is argued by the gas men that the water gas has a higher candle power. So it has, nominally, according to the common methods of measurement, but all I can say on that head is this: I would like to go back to the old coal gas simply and purely on candle power. The old light was a better light than the light today. Although the light today may read 24 candles and the old one read only 16, I know that the old gas was a better gas for domestic use, and I would rather pay $1.50 a thousand, which I used to pay for the old coal gas, simply from the lighting point of view, and without any connection whatever with sanitary ideas, than to pay what I do now for the so-called 24-candle water gas.

Massachusetts is entitled to credit for having required a record of cases of gas poisoning. She is not entitled to great credit for having repealed the ten per cent. law. Gas has become in Massachusetts, and especially in Rhode Island, a very important cause of death, and it is our business as sanitarians to take cognizance of that fact and as opportunity offers to act upon it.

The complete papers of the authors with diagrams and statistics will be published—probably in the *Journal of Infectious Diseases*—in the near future.

Notes and Reviews*

PUBLIC HEALTH NEWS AND NOTES.

By B. L. ARMS, M. D., Boston.
(*Reviewer.*)

Formation of Health Officers' Association in New Jersey.—At a meeting of executive officers of boards of health of New Jersey held at Newark, New Jersey, April 17th, 1911, a permanent organization to be known as "The Health Officers' Association of New Jersey" was formed. A number of the more prominent health officers of the State were present.

The objects of the organization are the advancement of knowledge relating to public health and sanitation and the encouragement of social intercourse among health board officials.

The following officers were elected:

President, C. H. Wells, Health Officer, Montclair; Vice-President, John O'Brien, Jr., Health Officer, Plainfield; Secretary and Treasurer, J. Scott MacNutt, Health Officer, Orange.

An Executive Committee of seven was elected, and the officers, with the advice of this Committee, were instructed to draw up a constitution and by-laws for presentation at the next meeting to be held May 17th.

The membership at present includes as eligible all health officials holding State Board of Health licenses, and doubtless will be extended to other health board officials and employees and to members of local boards of health.

Five or six meetings a year will be held for the presentation and discussion of papers. Most of the prominent health board officials of the State have expressed themselves as strongly in favor of the Association, which promises to grow rapidly in membership and influence.

"No Report" on Births and Deaths. From the March Bulletin of the Texas State Board of Health under the preceding heading is the following:

"With no desire to embarrass unduly or to give needless offense, but to indicate some of the difficulties encountered in the effort to secure trustworthy reports of births and deaths in Texas, the following list is presented,

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

showing the names of those from whom no reports of births and deaths had been received when the copy for the March Bulletin was closed on March 22. The list is almost staggering. These individuals failed to make reports, although the law says that all reports for any given months shall be mailed to the State Registrar of Vital Statistics on or before the 10th of the succeeding month, and despite the fact that cards were sent to the delinquents on March 15, indicating that reports were then overdue.

"It is altogether possible that some of those whose names are given will make reports within the next few days. In the case of a few others explanatory statements have been received which partially exculpate the writers from blame in the matter, in any event, there is absolutely no desire to humiliate or to do an injustice to any one. The fact remains, however, that this is a formidable list of delinquents, one which should not be found in a department of a state like Texas.

"The State Registrar desires to be of service to the local registrars and county clerks, upon whom is incumbent the duty of making reports to the State Board of Health. The Sanitary Code for Texas has now been enacted into rock-ribbed law, devoid of constitutional defect, and carrying adequate provision for the punishment of those who violate the law. A spirit of co-operation will at once make the reports of the State Registrar 40 per cent. more accurate and complete, and will make it possible for Texas soon to achieve recognition by the Federal Statistician as the only one of the Southern States whose Department of Vital Statistics merits approval of the national government." Then followed a list of 148 health officers, county clerks, and registrars. It is fair to assume that in the future reports will be forthcoming.

The same bulletin contains this note:

"A Good Move—Recently Dr. W. M. Brumby, formerly State Health Officer, now medical director of the Equitable Life Insurance Company, San Antonio, announced that his company will henceforth require a certified copy of the State Registrar's record as a proof of death before a claim is paid. Should all the life insurance companies operating in Texas adopt this plan, the vital statistics department would be greatly improved and the companies themselves could be protected against fraud."

Personals. Selskar M. Gunn, S. B., instructor in the biological department of the Massachusetts Institute of Technology, at the request of the city authorities, has gone to Milwaukee to make an investigation into the milk situation. The investigation is to be a thorough one extending over many weeks.

Chas. A. Magoon, A. B., a graduate of Bates in 1910, and since then a student in sanitary science at Massachusetts Institute of Technology, has accepted a position in the Boston Bio-Chemical Laboratories, Boston.

Program on Public Health and Sanitation at the Technology Congress. During the Semi-Centennial exercises at the Massachusetts Institute of Technology the following program was given April 11th, 1911, this being one section of a general program.

SECTION E—Public Health and Sanitation.

Chairman, Professor W. T. Sedgwick.

"Profitable and Fruitless Lines of Endeavor in Public Health Work", Edwin O, Jordan, '88, Professor of Bacteriology, University of Chicago, Chicago, Ill.

"The Technical School Man in Public Health Work," Harry W. Clark, '88, Chief Chemist, State Board of Health, Boston.

"Present Status of Water Purification in the United States and the Part that the Massachusetts Institute of Technology has Played," George C. Whipple, '89, Consulting Engineer, New York City.

"The Pollution of Streams by Manufacturing Wastes," Williams S. Johnson, '89, Sanitary and Hydraulic Engineer, Boston.

"Sewage Disposal with Respect to Offensive Odors," George W. Fuller, '90, Con. Hyd. Engineer and San. Expert, New York.

"The Food Inspection Chemist and His Work," Herman C. Lythgoe, '96, Analyst, State Board of Health, Boston.

"The Life Saving Corps of the Technical School," Severance Burrage, '92, Prof. Sanitary Science, Purdue University, Lafayette, Ind.

"Factory Sanitation and Efficiency," C. E. A. Winslow, '98, Assoc. Prof. of Biology, College of the City of New York, New York City.

"A Review of the Work of the Sanitary Research Laboratory and Sewage Experiment Station of the Massachusetts Institute of Technology," Earle B. Phelps, '99, Consulting Sanitary Expert, New York City.

"Bacteria and Decomposition," Simeon C. Keith, Jr., '93, Asst. Professor of Biology, Mass. Inst. Tech., Boston.

BOOK REVIEWS.

Hygiene and Public Health. By Louis C. Parks, M. D., D. P. H. Univ. of Lond. Consulting Sanitary Adviser to H. M. Office of Works, etc., and Henry R. Kenwood, M. B., F. R. S. Edin., D. P. S. Lond. Chadwick Prof. of Hygiene in the Univ. of London, etc. Published by P. Blakiston's Son & Co., Philadelphia. Price, $3.50 net.

This book of nearly 700 pages, which is, as the preface shows, "the 4th edition, under the conjoint authorship, of a work which had previously run through five editions," has been carefully revised, and new matter has been introduced where necessary, to bring the work up to date since the last edition in 1907.

The book contains 86 illustrations and is a practical, comprehensive work. The subject is taken up in thirteen chapters—water, garbage, air and ventilation, warming and lighting, soils and building sites, climate and meteorology, exercise and clothing, foods, beverages and condiments, the contagia, school hygiene, disinfection, statistics, and sanitary law and administration. Each is discussed fully from the standpoint of conditions in England. The chapter on communicable diseases—130 pages—deals with them, first, from their common aspects, and then the different infections are taken up specifically, the chapter concluding with a discussion of hospitals.

A few peculiarities are noted. In the light of our present knowledge of diphtheria it seems strange to find the following statement in a book on hygiene: "The etiology of this disease is still to a certain extent veiled in obscurity." At the end of this paragraph, however, the authors state that "chronic carriers" may account for much of the obscurity of origin. They also state that "It is never safe to allow recovered patients to mix with healthy people until at least fourteen days have elapsed since the disappearance of all membrane," which would extend quarantine in every case longer than the average duration of all cases in some cities where releases are made on a bacteriological basis.

Two pages are given to syphilis, but no mention is made of gonorrhea (urethritis) although about a third of a page is devoted to ophthalmia neonatorum, which subject is dismissed with this sentence: "In all forms of purulent ophthalmia a pyogenic organism—the staphylococcus pyogenes aureus or albus—is usually the active cause of the disease."

No mention of Negri bodies is made in speaking of the diagnosis of rabies, although the authors say that "The post mortem changes in canine rabies are neither constant nor specific; but the following diagnostic appearances may be mentioned—emaciation, dark blood, hyperemia of mucous membranes and of many of the internal organs, the frequent presence of foreign bodies in the pharynx, etc."

On the whole the book is very readable and is a distinct addition to our works on hygiene.

B. L. Arms.

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EDITORIALS

IS A SANITARY INSTITUTE FOR AMERICA NEEDED?

ONE of the greatest difficulties that medical officers of health in our towns and cities have to meet is that of obtaining the services of properly qualified men as sanitary officers. The reason is not far to seek; there is no college, institute, or school on the American continent in which the many branches of hygiene and sanitary science are thoroughly taught. Our medical colleges, it is true, include hygiene in their courses, but they do not go into many phases of the subject; and their veterinary colleges turn out meat inspectors, but teach nothing concerning the numerous foods and drinks not of animal origin. It is high time, therefore, for hygiene to be given its proper place on this continent among the sciences, arts, and professions, and for the formation of a representative body of men from the different professions dealing with the various phases of public health work. In the great majority of cases, the men acting as sanitary officers in our towns and cities have learned all they know concerning hygiene and sanitation after being appointed. Many of them are earnest students and a credit to the positions they hold. Others, unfortunately, hold their positions for the dollars they derive from them, and make no effort beyond what is absolutely necessary to enable them to

draw their salaries. Unfortunately, too often it does not matter how brilliant a man is, or how earnest a student; he has no means of obtaining official recognition of his abilities, as there are no recognized examining and certifying bodies to which he might apply for the certificate as to his qualifications. In many health departments, we find physicians, veterinarians, and laymen, working side by side, all doing the same class of work. Not infrequently a certain amount of friction between them is generated, whereas if there were an official examining body, each might be able to be graded according to his ability in the field of hygiene and sanitation.

The need for an examining and certifying body to pass upon the qualifications of sanitary inspectors, and those aspiring to be sanitary inspectors, has been met in England by the Royal Sanitary Institute, with its headquarters at London, England. The objects of the Royal Sanitary Institute are to promote the advancement of sanitary science in all or any of its branches and to diffuse knowledge relating thereto. The Institute has for its patron, the King, and for its President and Vice-Presidents, the leading members of the nobility. It is governed by a council of thirty-one members, consisting of the leading men in medicine, engineering, architecture, law, and the other professions, and in the Army. It derives its support from donations, the annual fees of members and associates, and the examination fees of candidates. Sessional meetings of the Institute are held in London and in various provincial centers for the reading of papers and the discussion of subjects relating to sanitary science. The institute publishes a monthly journal, the Journal of the Royal Sanitary Institute, which contains items of interest to those working in public health. It maintains a museum and a library pertaining to public health work. Courses of lectures and demonstrations are held, specially adapted for candidates preparing for the examinations held by the institute. Examinations are held and certificates of competency are given as the result thereof, for sanitary inspectors, in sanitary science as applied to buildings and public works, for inspectors of meat and other foods, in hygiene and its bearing on school life, for school teachers and school nurses.

There are branches of the Institute in the various English colonies.

Is there not room for the expansion of the American Public Health Association along the lines of the Royal Sanitary Institute? America has many sanitary problems to deal with, and if the Association could hold sessional meetings in various parts of America, in addition to the annual meetings, opportunities for the interchange of views would be greatly improved. If the Association were to prescribe courses for sanitary inspectors, food inspectors, and possibly for other classes of public health workers, and were to examine candidates for certificates as to proficiency with respect

to the particular line of work which they sought to enter, after having been assured of a proper course of study under competent guidance, health officers would find it less difficult to pass upon the qualifications of the inspectors working under them and of applicants for appointments to inspectorships. Naturally, the headquarters of such an institute would be in Washington, where so many scientists are stationed. There would, of course, be branches in every state in the Union, and in the provinces of Canada, and of Mexico, and Cuba. It would seem well for the members of the American Public Health Association to express their views with reference to this project, through the pages of the Journal, without waiting for the annual meeting of the Association.

Disraeli said: "Public health is the foundation on which rests the happiness of the people and the power of the state,—that is why I consider the first duty of a statesman is the care of public health." Let us, therefore strengthen the foundation already laid by the various professions interested in public health, by expanding the American Public Health Association in fact, if not in name, to an American Sanitary Institute.

P. B. Tustin,
Associate Royal Sanitary Institute, England; Chief of Food and Dairy Division, Winnipeg, Canada.

THE PRESENT ORGANIZATION AND WORK FOR THE PROTECTION OF PUBLIC HEALTH IN CANADA.

By DR. FREDERICK MONTIZAMBERT,
Ottawa, Ontario.

The administration of public health in Canada is joint between the Dominion and the Provinces, in virtue of the Act of Confederation. The administration of the subject of quarantine pertains solely to the Dominion Government, and includes the inspection and treatment of passengers, crews, and vessels from abroad arriving at the different seaports on the Atlantic and Pacific Coasts, and of the persons and trains entering Canada over the international frontier.

Throughout the Dominion leprosy is dealt with by the federal government, as is the sanitation of construction camps in connection with railroads and canals. These matters are administered by the Public Health Branch of the Department of Agriculture. The Immigration Branch of the Department of the Interior deals with minor contagious diseases, such as trachoma and favus, and with the deportation of undesirable immigrants.

Sick seamen suffering from non-infectious diseases are looked after the Department of Marine and Fisheries. The Department of Militia, the Indian Department, the Royal N. W. M. P., and the Naval Department have their own special medical services.

The adulteration of foods and drugs is dealt with by the Department of Inland Revenue.

Infectious and other diseases occurring within the Dominion are under the administration of the provincial and municipal authorities.

The Canadian Medical Association has for several years past submitted recommendations to the federal government for the combining of the different matters in connection with public health which are under its administration into a Department of Public Health under one of the existing ministers. No action has as yet been taken in this matter by the government.

The recently established Commission of Conservation of the natural resources of the country includes a section on public health. Our friend

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept., 1910.

and fellow member, Dr. C. A. Hodgetts, has been appointed its medical advisor. The functions of this Commission are advisory only.

As a minor matter in connection with the health of the country, I may mention that the Saint Johns Ambulance Association of England has, during the last year, sent out a colonial organizer to establish branches of the Association in the dependencies of the Empire. The Canadian branch was established last winter, and is now proceding with the organization of provincial and local centers, in the hope that gradually this work will be so extended among the police, firemen, railway and steamboat hands, and the workers in mills, mines, factories, departmental stores and similar industries and organizations, that before very long wherever an accident occurs there may be at least one person present, who, having received instruction in first aid to the wounded, will know what to do and what not to do, until medical aid has arrived.

At Ottawa also there is a Canadian Association for the Prevention of Tuberculosis, which is assisted by the federal government with an annual grant of $10,000. Its functions are educational only, and it works through the distribution of pamphlets and leaflets broadcast throughout the country and in the sending to different parts of the various provinces its lecturer, who holds meetings and endeavors to organize leagues and local associations for the prevention of this disease. And provincial and local leagues are now at work throughout the Dominion.

THE CANADIAN COMMISSION OF CONSERVATION AND PUBLIC HEALTH.*

CHAS. A. HODGETTS, M. D.,

L. R. C. P., London, England; Fellow of the Royal Sanitary Institute, etc.; Medical Adviser to The Commission of Conservation, Ottawa, Canada.

The prominence given to the conservation of national resources in the United States by Ex-President Col. Theodore Roosevelt is well known to all. Suffice it to say that the ideas promulgated in the United States, having chiefly for their object the conserving of all the natural resources of this country, were soon taken hold of by a leading statesman of Canada, the Hon. Clifford Sifton, and on May 19th, 1909, an Act was passed by the Senate and the House of Commons, establishing a Commission for the Conservation of Natural Resources.

As constituted, the Commission consists of twenty members appointed by the Governor in Council, and at least one so appointed from each province shall be a member of the faculty of a university within such province. The *ex officio* members are "The Minister of Agriculture, the Minister of the Interior, the Minister of Mines of the federal government, and the member of each provincial government who is charged with the administration of the natural resources of such province."

The chairman is the administrative head of the Commission, and directs the work of the permanent officers.

Under section 9 of the Act, no fees or emoluments of any kind can be received by the chairman or members.

The duties of the Commission cannot be more tersely stated than as set forth in section 10 of the Act:

> "It shall be the duty of the Commission to take into consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations inside and outside of Canada, and frame such recommendations as seem conducive to the accomplishment of that end."

For working expenses Parliament set apart the sum of fifty thousand dollars, and now the work is actively going on.

From a reading of the Act itself it might be thought that the Parliament of Canada had little or no idea of public health being one of the ques-

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 1910.

tions which would be brought before the notice of the Commission, but at the first annual meeting held in Ottawa, January 18th, 1910, Dr. P. H. Bryce, Chief Medical Officer, Department of the Interior, and an ex-President of this Association, read a paper entitled "Measures for the Improvement and Maintenance of the Public Health," in which he discussed (1) the value of population as a national asset; (2) the preservation of infant life; (3) the health of school children; (4) typhoid fever; (5) tuberculosis; (6) deaths due to industrial causes; (7) preventive measures; and in concluding this excellent article, said:

"Public health is no longer to be classed as an IMPONDERABLE but as a ponderable entity, to be dealt with along lines as exact as the building of a railway of minimum grades, or the getting of the highest mechanical efficiency out of a well-constructed steam engine." Later the Standing Committee of the Senate on Public Health and Inspection of Foods referred to the Commission the important question of the pollution of our lakes and rivers by sewage and factory wastes, and also a Bill which had for its object the prevention of the pollution of all navigable waterways and of all waters tributary thereto. Again, the members of the House of Commons, in discussing the question of tuberculosis, had expressed an unanimous desire that some action should be taken to deal with the subject from a national standpoint.

It will thus be seen that at the very inception of conservation work, most important questions relating to the lives of the people of Canada were brought before it for investigation and report.

That the master mind of the movement in Canada was fully seized with the value of human life as a national asset was evident, for in his inaugural address Mr. Sifton spoke in regard to public health as follows:

"The Dominion spends hundreds of thousands of dollars in eradicating the diseases of animals, and the work, it is pleasing to know, is being done with thoroughness. But no similar effort is made by Province or Dominion to meet the ravages of diseases among human beings, such., e. g., as tuberculosis. Lately this subject was brought before the House of Commons by Mr. George H. Perley, M. P., and an illuminating debate followed. It is probable that Parliament would readily consent to the necessary appropriation for undertaking to deal with the evil. This, however, is one of the subjects upon which federal and provincial jurisdictions overlap, and in which any effective action will require to be carefully worked out and agreed to between all the governments concerned. A sub-committee from this Commission, representing as it does, all the governments, might well be able to work out an acceptable and useful plan which would receive general assent."

No doubt as a result of this, one of the committees of the Commission is that on Public Health, the chairman being Mr. E. B. Osler, M. P., Toronto, who takes a deep interest in the work."

The duties of the Commission are not in the least executive. They are simply advisory to the Governments of Canada. This was clearly set forth by the Honorable Mr. Sifton in his opening address, as follows:

"The Commission, it is to be noted, is exceptional in its character.

"First, it is not a portion of the ordinary governmental administration for which the government is politically responsible. It is a Commission created by Parliament and entrusted with certain duties, upon the performance of which it is to report from time to time. The funds necessary for carrying on the work must, it is true, be procured by application to the government of the day, which will introduce the necessary estimates; but, otherwise, the work is totally independent of the ordinary administration of affairs."

"The Commission is not an executive nor an administrative body. It has no executive or administrative powers. Its constitution gives it power to take into consideration every subject which may be regarded by its members as related to the conservation of natural resources, but the results of that consideration are advisory only. In a sentence, the Commission is a body constituted for the purpose of collecting exact information, deliberating upon, digesting, and assimilating this information so as to render it of practical benefit to the country, and for the purpose of advising upon all questions of policy that may arise in reference to the actual administration of natural resources where the question of their effective conservation and economical use is concerned.

"The effectiveness of our work will depend upon its own merits. We can only study, investigate, and advise. The governments concerned must take the responsibility of accepting or rejecting what we recommend."

For a more ready conception of the possibilities existing in the Dominion of Canada for any schemes of national health work being inaugurated, it is necessary to outline briefly the relationship existing between the federal government and that of the nine provinces into which the Dominion is divided for purposes of local government.

The B. N. A. Act was an Act of the British House of Commons, and set apart the British Possessions in North America, with the exception of Newfoundland and Labrador, as The Dominion of Canada, and delegated certain functions to the federal government of national importance, while setting apart for the provinces duties of a domestic character, such as municipal laws, care of insane, and similar work.

Confederation occurred July 1st, 1867, at a time when little was thought of hygiene or sanitation, to say nothing about the many subjects now classed under the generic term, "public health," and so for nearly four years following 1867 all the work done under the name of public health was carried on by the federal government by the men who had been instrumental in securing the Act of Confederation, and it was not by any Act of the Federal Government that public health was delegated to the provinces.

Indeed, not being specifically mentioned as coming within their prerogative, it is a matter to be dealt with along national lines, which is quite the reverse in the United States, where the sovereign power of each state of the Union has to be considered, and where the states created the federal body.

It is quite true that each province now has its own health act, and strives in some kind of way to prevent the spread of communicable diseases, abate nuisances, adopt plumbing by-laws and make a pretense of looking after some of the minor matters included under the term "public health." No one can claim they have made even a pretense to grapple with the weightier and more important problems relating to the health of the people.

I have recently gathered from all portions of this continent samples of the literature issued by the various state, provincial, and municipal health authorities, and note a preponderance of the class relating to communicable diseases and disinfection. Occasionally there was found literature relating to infantile feeding, clean milk, ophthalmia neonatorum, and other subjects outside the usual rut. The general indications were such as to characterize public health work on this continent as being of a low order. Boards of health are apparently satisfied with directing their energies upon what I should term matters of "quarantine" and "municipal sanitation." They are like the man in Pilgrim's Progress who, bent to earth, is satisfied to ply his muck rake, notwithstanding the fact that the angel of light stands by offering him all the delights of a golden crown of life.

Fellow workers in public health: something is radically wrong! You are handling the muck with the muck-rake, and others are reaching forth to the golden crowns offered by the Goddess of Hygiene.

That this is a fact you have but to refer to the preliminary announcement as issued by this Association, on page 6 of which, amongst "Topics for Discussion," we find number three to be "The Inter-Relation of National Organizations Working in the Interests of Health;" and the symposium to be presented cannot but be of great import to this Association, as well as to the nations we represent, for it will show us that as health officers we have a higher destiny to fill than directing the use of the muck rake and checkmating the inroads of communicable diseases.

The fault is not yours, for you are merely wielding the instruments placed in your hands by legislators. You are like a tethered cow which must daily graze over a well-cropped area, although rich, luxuriant pasture lies just beyond. These, by right of inheritance and ownership, are yours. The divide is the legislature, and it is just this divide that the Commis-

sion of Conservation must direct and lead, if we are to see the sanitarian enter into and possess his own.

That in a wealthy country like the United States the important and advanced work of sanitary science should be carried on by charitable organizations, by endowment funds, and not by the men who are nominally the leaders of public health, is a mistake. That these various branches of higher public health work are not directed by a national department of health is lamentable indeed. In Canada I consider it as criminal indifference on the part of those responsible for its government. For why so much time, attention, and money should be spent on beasts and fishes to the almost utter neglect of all that appertains to the well being and life of human beings, is past comprehension.

Health is national, health is state or provincial, health is municipal, health is individual in its scope and application. It is like a beautiful tapestry, only perfect and complete with a warp and woof of a national health organization, supplemented by and co-ordinated with uniform state health departments, each working in its own geographical division, the coloring being given by the municipal health authorities, who must be depended upon to carry out the technique. The finish is given by each individual in the community paying strict attention to the laws of personal and home hygiene.

The time has arrived when public health must be a more prominent feature in national government than has hitherto been the case. The public are beginning to realize that the wealth of a nation does not consist in its natural resources, its agriculture, and its manufactures. They realize there is a priceless thing which cannot be reckoned by dollars and cents. It is the health of its citizens, and it is this Canadian treasure which the Commission of Conservation will make its serious study; and if the federal and provincial governments fail to profit by the suggestions and recommendations made for the betterment of the health of the people, then the responsibility must be placed upon their shoulders, and certain it is the public and the press will not be slow in passing judgment.

And if the provinces fail to respond, certainly Canada is not wanting in precedents where the federal government has, for reasons, taken to itself powers and duties which previously had been exercised by the provinces. The reasons have always been of a financial character, e. g., the control and prevention of contagious diseases in animals, and quite recently the reverting to Dominion inspection of fisheries, a recent statement having been made that forty inspectors would be appointed in Ontario, one for each county, who will be paid sufficient salary to enable them to devote their whole time to the work.

Would that the same or similar interest were taken by the federal government in the matter of public health; for who will be bold enough to say that the Provinces have made satisfactory progress either in public health legislation or in the enforcement of the laws now on the statute books? Indeed, where can the man be found to say that the federal government has given the aid, both legislative and financial, to the Director General of Public Health which the importance of his branch demands. If that officer had but been given the financial aid he desired, Canada would not now be without a national laboratory of public health.

But there are signs of forward movement, as already indicated, and it is fondly hoped that an impetus will be given to public health work, such as has heretofore not been thought of. The hard pioneer work is behind us, with the results now with us, and upon that which has been well and truly laid the future superstructure must be raised.

The building must be upon the higher lines of public health, embracing all that tends to prevent disease, to improve environment, to propagate and build up a healthy race, prolong life, and lessen suffering. The prospects are bright. The work is great, and those engaged in it will not live to see the fruits of their labors. That is a possession into which others must enter.

It would be out of place for me to do more than indicate the line along which the work must be carried on. Certain it is there must be a directing hand. The executive office has been in existence for years, and the Director-General of Public Health must be assisted by competent officers, each proficient in his own branch of public health work. And further, the Advisory Council is within reach in the personnel of the chief health officers of the several provinces.

There are certain functions which should be delegated to a reorganized national bureau, or department of health. Matters interprovincial, international, and national which are not now, and cannot be, handled under the present condition of affairs, but which, in the highest interest of Canada, must be dealt with by a federal authority, having at his command the best equipment which it is possible for any national department of health to possess.

ORGANIZATION OF THE SANITARY SERVICE IN THE FEDERAL DISTRICT, TERRITORIES, SEAPORTS, AND PRINCIPAL FRONTIER CITIES OF THE MEXICAN REPUBLIC.

By Dr. EDUARDO LICEAGA,
Mexico City, Mexico.

In Mexico, we have a Supreme Board of Health, consisting of a president, ten members and a general secretary. Of the members, six are physicians, one a pharmacist, one a veterinary surgeon, one a sanitary engineer, and one a lawyer. This Board fills the office of consulting body in all matters of hygiene, and has executive powers, being a dependency of the Department of the Interior. In all matters of International Sanitary Police, it acts as a federal authority; in other matters, it is the sanitary authority of the Federal District.

In order to facilitate the enforcement of measures affecting the health of the City of Mexico and Federal District, the President of the Board of Health is one of the three members of the Superior Board of Government of the Federal District, which organization has its analogy in the District of Columbia, U. S. A.

The laws which govern public health are the Sanitary Code and the Maritime Sanitary Regulations, together with the Sanitary Convention of Washington. There is an Immigration Law which places this service under the immediate supervision of the Minister of the Interior.

The Supreme Board of Health has exercised a powerful influence in spreading a knowledge of public hygiene throughout the national territory, and many of the states of the Union have adopted the Sanitary Code or have adapted it to their special legislation, following its general principles, or those of the regulations to which it gives rise. The results are that the sanitary legislation of the entire Republic is undergoing unification. Furthermore, some of the republics of Latin origin have also adopted our code by adapting it to their national requirements.

As already stated, the Supreme Board of Health has under its charge the sanitary service of the ports and frontier cities, and from this point of view the service is centralized in the hands of the federal government. This circumstance has allowed the Mexican Republic to take part in the sanitary conventions which have twice been held in the City of Washington, once in Mexico and once in San Jose, Costa Rica; and this same cen-

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, Sept. 1910.

tralization has allowed our government to accept the Convention of Washington, of October 14, 1905; and what is still of greater importance, it has faithfully complied with the stipulations of that international agreement in a way that could not be done by other nations which do not have the same sanitary centralization that we have. From what has been said it will be apparent that the quarantine service is under the exclusive charge of the Federal Government.

Great progress has been made in the centralization of the other sanitary activities and in the preparation for the establishment of a Secretariat which will have under its charge the public hygiene of the entire nation. The states on the Pacific Coast delegated their sovereign powers as regards public health to the federal government when the bubonic plague invaded the Port of Mazatlan, as did some other small towns in the State of Sinaloa; whilst the Gulf States, as well as others in the interior, such as Coahuila and Nuevo Leon, did the same thing in 1903, when yellow fever invaded our gulf ports and spread to those states, as far as Laredo in Tamaulipas. Thanks to this circumstance, we have been able to suppress yellow fever throughout the country; not a single case of this disease has been observed throughout the national territory since the 20th of December, 1909. In spite of this happy result, the sanitary brigades continue to work as actively as when the epidemic existed, and now they can dedicate their efforts with greater energy to the struggle against malaria.

One fact I must mention, which, though it does not relate to the organization of the sanitary services, has raised the prestige of our Board of Health both in the Republic and abroad: we have inculcated in our subordinates the conviction that they must always tell the truth in making a declaration of any disease which is the subject for quarantine, even though it may injure our commercial interests and the easy communication between the people.

In compliance with this principle, I have for nineteen years appeared before this Association to report on the yellow fever conditions in Mexico, whatever may have been the situation. I am now able to declare that the disease no longer exists in Mexico. The Supreme Board of Health issues a weekly report of health conditions to the Public Health Service and Marine Hospital Service of the United States, to the Republic of Cuba, and through the State Department, to the Diplomatic and Consular Agents of all the nations which maintain friendly and trade relations with our own.

Another service which is rendered by the Mexican Board of Health is the education of the public in sanitary matters. Through the channel of the bulletin of the Board, pamphlets, and other publications, a general

knowledge has been imparted of the doctrine of the transmission of tuberculosis, diphtheria, yellow fever, malaria, and similar diseases, so that the people are now commencing to take measures for their own defense, and to demand of the sanitary authorities the isolation of patients, the disinfection of dwellings and other similar sanitary precautions.

The organization given to the sanitary services and the work carried out by the sanitary authorities, can therefore be summarized as follows:

The Supreme Board of Health, which issued its Sanitary Code in 1891 and its Maritime Sanitary Regulations in 1894, has amended its laws according to the requirements of science, and is contributing to the unification of the sanitary laws in all the States of the Mexican Republic; it has centralized the quarantine service in the ports and frontier cities, and has got the different states to delegate their sovereign powers to the federal government, as far as regards the public health, whenever any great calamity has arisen, such as bubonic plague, yellow fever, or malaria, with the result that bubonic plague and yellow fever have been extinguished, and efforts are being made to obtain the same result with malaria.

THE PRESENT ORGANIZATION AND WORK FOR THE PROTECTION OF HEALTH IN CUBA.*

By Dr. FEDERICO TORRALBAS,
Havana, Cuba.

Cuba is the only country that has a national department of health. This is in great part due to the energy of one of our distinguished members, Colonel Kean. The sanitary department of Cuba employs a member of the Cabinet who acts as secretary of sanitation work and has general charge of it. The work itself has been divided into different branches—one branch relates to sanitation and the other to charity. Between these branches and the secretary there is what we call a superior board of health, an advisory council or body to recommend whatever measures they may deem necessary. This board is formed from delegations not only from the different branches of the sanitary offices, but also from bodies more or less related to public health work. For example, the Professor of Hygiene in the University of Havana is a delegate from the tuberculosis league. The direction of sanitation, as it is called, embraces the whole control of this work. Every municipality has an officer in charge who represents the commissioner of health, and who is supposed to have a complete staff to cover all branches. We have divided the work in the City of Havana, which may serve as an example, in the following way: One section deals exclusively with infectious diseases, and to this section are sent all reports from practicing physicians; there is also a disinfection department, which is supposed to look after work of that character, and an engineering department, which has supervision over all the problems in connection on with the disposal of sewage, and kindred matters.

I am glad to be able to say that in the near future a new system of sewerage will be completed in Havana, at which time the sewage problem will be solved.

Another section is, of course, related to vital statistics and collateral work. But the most important work the Havana authorities give their time to is the one connected with fighting the mosquito, and, in connection with this, we have a force of sixty-four inspectors who represent as many districts. These inspectors are obliged to look after all the places likely to be breeding places for mosquitoes and report everything which seems to be unfit or unsuitable for protecting the health of Havana; and

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when they send in their reports, an expert from these different sections is sent to investigate and give thorough attention to the situation. Further, the director of sanitation has a body of inspectors who are sent around the island to do investigation work. To carry on the work we have two laboratories, one newly established. The national laboratory, where all examinations are made for clinical and microscopical purposes, for the examination of swabs, and for miliary tuberculosis, is an important aid. There is also a newly-established research laboratory for scientific work on a large scale.

As to maritime inspection, we not only inspect the vessels bound for Havana, the crew, and the passengers, but we have representatives stationed at those ports where there is likelihood of infection, whose duties are similar to those performed by the marine physicians for the Marine Hospital Service of the United States.

The other department relates to charity work. This department is of no special interest although it gives us good control of conditions and an opportunity to come into contact with all of the diseases common to the poorer classes.

STUDIES ON THE SELF-PURIFICATION OF STREAMS.

GUSTAV F. RUEDIGER, M. D.,
Director, State Public Health Laboratory, University of North Dakota, Grand Forks, North Dakota.

While making routine bacteriological examinations of the water supply of Grand Forks, I was impressed by the fact that both the raw and the filtered water contains many more colon bacilli during the winter months when the river is covered with a thick layer of ice, than during the summer months, when the river is open. The water supply of Grand Forks is taken from Red Lake River in Minnesota, which is polluted with the raw sewage of Crookston, a Minnesota city of about 7,000 population. Crookston is twenty-eight miles above Grand Forks by rail, but the distance along the river is estimated to be from eighty to ninety miles. It takes about 48 hours for the water to flow from Crookston to Grand Forks.

As the amount of excretal waste in the sewage, and hence the number of colon bacilli in it at the point where the sewage enters the river, are presumably as large in the summer as in the winter, it has seemed that there must be a much more rapid destruction of these organisms in the river during the summer months than during the winter months. The experiments and analyses to be presented here were undertaken for the purpose of proving or disproving this assumption.

We know from the exhaustive studies of Russell, Jordan, Zeit, and others, that typhoid bacilli and colon bacilli do not survive many days in the waters of a heavily polluted river. In all of these studies, however, not much attention was paid to the seasonal variation in the self-purification of the streams studied. This paper deals particularly with that phase of the problem.

We know that the amount of sewage entering a river from a small city varies greatly during a 24-hour period. This is shown in the following set of analyses of samples collected at intervals of six hours, at a point in the middle of the river, about three-quarters of a mile below the outlet of the main sewer at Crookston. The river here is only about 75 feet wide and makes several sharp turns which thoroughly mix the sewage with the water in a very short time.

The analyses gave the following results: 10 A. M., 28 *B. coli* per cc.; 4 P. M., 27; 9 P. M., 25, and 4 A. M., 8 *B. coli* per cc.

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If therefore we wish to ascertain just how many *B. coli* there are in that water at a point below, it is essential that at least three or four samples be collected and analyzed during a 24-hour period.

Table 1 sets forth the results of eight analyses, each of which represents the average of four analyses of samples collected above the Grand Forks sewers at intervals of 6 hours. The first six analyses were made in summer, and the other two last winter when the river was covered with ice averaging about 30 inches in thickness. The water collected at this point was polluted at Crookston, from 80 to 90 miles farther up the river, and the time consumed in the flow from the point of pollution to the point of collection and analysis was approximately 48 hours.

TABLE 1.

Showing Variation in Number of B. Coli per CC. in Red Lake River Water At Different Times of Year. Samples Collected Above Grand Forks; Pollution At Crookston, Minn.

Date	B. Coli per CC.	Volume of Water in River: Cubic Ft. per Second	Calculated Number B. coli per cc. if Volume of Water Always Equals 750 Cu. Ft.
River Not Covered With Ice.			
June 18, 1909	$2\frac{1}{8}$	1120	3
July 12, 1909	$3\frac{1}{2}$	782	3.5
September 11, 1909	$6\frac{1}{4}$	1000	7.3
June 4, 1910	2	1180	3.3
June 28, 1910	$5\frac{1}{2}$	750	5.5
August 15, 1910	6	300	2.4
River Covered With Ice.			
January 18, 1910	*$15\frac{1}{2}$	770	15.5
March 1, 1910	$17\frac{1}{3}$	610	14.

* The figures represent the average of four analyses of samples collected during a 24-hour period, at intervals of 6 hours. The individual examinations vary greatly, as is shown by the following example: 8 A. M.—14 B. coli per cc.; 2 P. M.—24 B. coli per cc.; 9 P. M.—14 B. coli per cc.; and 3 A. M.—10 B. coli per cc.; average. 15.5.

The table shows that the water in Red Lake River contains from four to five times as many *B. coli* per cubic centimeter during the winter months as it does during the early part of the summer. The amount of pollution at Crookston is approximately the same all the year round, and hence this difference in the number of *B. coli* must be due to a more rapid destruction of these organisms during the summer months. During the latter part of the summer the number of *B. coli* per cubic centimeter is found to be somewhat higher than during the early part of the summer. This is not entirely accounted for by the decrease of the volume of water in the latter part of the summer.

The volume of water in the river varies greatly at different times of the year, but the U. S. Geological Survey takes daily readings to estimate the average daily flow. I am indebted to Prof. E. F. Chandler, of the University of North Dakota, for the readings giving the number of cubic feet per second. If from these figures we calculate the number of *B. coli* per cubic centimeter that would be found if there were no variation in the dilution, we find that these figures correspond very closely to those found in the analyses. This calculation is made on the basis of 750 cubic feet of water per second, which is about the average flow for the entire year.

Although the amount of sewage entering the river at Crookston is no greater in the winter than it is in the summer, it must be admitted that we have no means of determining how many *B. coli* get into the river from fields and barn-yards. It is certain, however, that more of these organisms would get into the water from the latter sources during the summer months than during the winter months, and hence this factor does not in any way weaken the conclusions to be drawn from these analyses.

The technique employed in these analyses was the very simplest. Litmus lactose agar plates were made, using 1 cc. of the sample when there were many *B. coli*, and 2 or 3 cc. when there were not so many. Melted agar tubes were inoculated either with $\frac{1}{3}$ or $\frac{1}{2}$ cc. of the sample, poured into clay-covered Petri dishes and incubated at 39°C. for 36 hours. A count was then made of all colonies that looked like *B. coli*, and these were subcultured by making lactose agar stab cultures. When there were more than 12 colonies per cc. that looked like *B. coli*, only half of them were subcultured and the final result was multiplied by two. All cultures that did not produce gas in the lactose agar stab in 48 hours were discarded. Those that produced gas were planted in Dunham's solution and in gelatin. The morphology was studied in hanging drops from the growths in Dunham's solution. Only those cultures were accepted as *B. coli* which produced gas in lactose agar, did not liquefy gelatin in four or five days, produced indol in Dunham's solution, and were found to be bacilli.

Dialyser experiments were now carried out with the idea of either corroborating or contradicting the preceding results. Both parchment paper and celloidin sacs were used. According to Todd, results obtained from dialyser experiments are untrustworthy and must be gone over again before they are accepted. Todd found that typhoid bacilli grow through these dialysing membranes in a comparatively short time. I have repeated his experiments and was able to confirm his results, but I must dissent from his general conclusions. It was found that typhoid bacilli do not readily pass through a properly made, heavy celloidin sac, and scarcely pass

at all during the first 24 hours. I am satisfied that experiments with heavy celloidin dialysers give very trustworthy results. All dialysers must be tested with egg albumen and by blowing into them when submerged in water. Parchment paper was found to be unreliable, as typhoid bacilli grow through it quite readily.

The first set of experiments of this character was to float dialysers down the river from Crookston, to Grand Forks, North Dakota. The dialysers were charged with 25 cubic centimeters of polluted river water, to which was added ½ cc. of a twenty-four hour culture of Bacillus typhosus, containing approximately 166,000,000 organisms. At the end of the journey, which took 54 hours, there were left alive 0.11 of one per cent. of the bacilli in one dialyser, and only 0.013% in the other. It is needless to say that the river at that time was not covered with ice.

As it is impossible to float the dialysers down the river when it is covered with ice, they were suspended in the river through a hole in the ice, so as to get winter experiments. Parallel experiments had to be made during the summer months when the river was open. The results of several of these experiments are shown in Table 3:

TABLE 3.

SHOWING THE DIFFERENCE IN RATE OF DESTRUCTION OF TYPHOID BACILLI IN DIALYSERS HUNG IN OPEN RIVER AND IN RIVER COVERED WITH ICE.

DIALYSERS HUNG IN OPEN RIVER.

B. typhosus introduced	B. typhosus left.
62,000,000	2,200,000=3.5% after 48 hours
62,000,000	1,274,000=2.5% after 48 hours
65,600,000	340,000=0.51% after 72 hours
65,000,000	585,000=0.89% after 72 hours
7,200,000	161,500=2.2 % after 72 hours
7,200,000	232,900=3.2 % after 72 hours

DIALYSERS HUNG IN RIVER UNDER ICE

B. typhosus introduced	B. typhosus left.
410,000,000	128,000,000=31. % after 3 days
410,000,000	78,000,000=19. % after 7 days
410,000,000	10,037,000= 2.5% after 14 days
15,000,000	915,000= 6.1% after 2 days
13,000,000	1,365,000=10.5% after 2 days
10,400,000	4,867,000=46.8% after 2 days
190,000,000	4,867,200=17.7% after 2 days
124,000,000	76,080,000=62.9% after 2 days

All dialysers contained 25 cc. of polluted river water, to which were added typhoid bacilli.

These experiments show clearly that typhoid bacilli will live five or six times as long in polluted river water when the river is covered with a

thick layer of ice, as they will in that same river during the summer months when the river is open.

Further experiments were now carried out to determine if possible just what forces in nature are responsible for the self-purification of this river during the summer months, but are wanting or much less effective when the river is covered with ice. The experiments thus far indicate that the presence of microscopic plants and saprophytic bacteria is the most important factor, but the effects of the sun's rays also are of great importance. The number of *B. coli* in the river goes up when the total bacterial count goes down, and *vice versa.*

CONCLUSIONS.

Colon bacilli and typhoid bacilli disappear much more rapidly from polluted river water during the summer months than during the winter months when the river is covered with ice and snow.

The destruction of these organisms in the river water during the summer months is in large measure due to the growth of microscopic plants and other organisms which apparently give off dialysable substances which are harmful to *B. coli* and *B. typhosus.* That such substances are given off by the saprophytic bacteria was clearly shown by Frost several years ago, and my experiments simply confirm his by attacking the problem in a slightly different way. These effects are lost in the winter, as no growth takes place at 0° C.

The direct rays of the sun are also an important factor, and their effects are entirely lost when the river is covered with a thick layer of ice and snow.

The practical value of this investigation is very evident. It explains why some of our northern cities where sewage-polluted river water is used in the water works system are more frequently troubled with outbreaks of typhoid fever during the winter months. This was illustrated at Minneapolis last winter, and I believe was true at Lawrence, Massachusetts, before the installation of the filter.

When bacteriological analyses of sewage-polluted river water are to be made at the site of a proposed water-works intake pipe, it is important that samples should be collected and analyzed both in the winter and in the summer. Analyses of samples collected during the summer do not give reliable information in regard to the condition of that water when the river is covered with ice and snow. My analyses show that the pathogenic bacteria from the sewage travel several times as far in the water under the ice before they are destroyed, as they will during warm weather in an open river.

DISCUSSION.

Dr. H. W. Hill, Minneapolis, Minnesota. The experiments made by Dr. Ruediger have explained and confirmed the conditions which we have for some years recognized and which we have designated as winter river typhoid. Dr. Ruediger has found, experimentally, good evidence that the typhoid bacilli may die out in going a certain distance down a river in summer, although in winter they may travel the same or greater distance alive, and be capable of infection. The exact distance of travel before death supervenes under summer conditions and under winter conditions is yet to be determined, and probably varies with many factors—for example, turbidity, depth, and the rapidity of flow. But it is an epidemiological fact that winter typhoid occurs in cities using river water which is contaminated higher up, while the same cities escape typhoid in summer. This is well established in our section of the country.

In this connection I would like to quote Dr. Lumsden, Epidemiologist of the United States Public Health and Marine Hospital Service. He was at one time rather skeptical of our findings concerning winter river typhoid, but this spring in Washington confessed that we were wholly right, having himself seen a beautiful example of it at Omaha during the winter.

Dr. Peter H. Bryce. The question of sedimentation in the river during the two days prior to the taking of samples has apparently not been taken into account. Pettenkofer's test, made a long time ago at Munich, showed that about ninety per cent. of all bacteria in water disappeared within a distance of ten miles, because of dilution and sedimentation. Franklin's experiments showed that when inoculated Petri plates were suspended two meters below the surface of the water in cold weather all bacteria in the plate that was exposed to sunlight were killed within a short time, while on the plates that had a carbon covering to shut out sunlight bacteria grew quite freely.

During flood times, when there is little or no direct sunlight, when rivers are turbid and rapid, pollution extends much further than in dry seasons; as, for example, in the Middleborough-on-the-Tees epidemic in England years ago, when sewage was carried some twenty-five miles from the then source of supposed pollution and caused a river epidemic.

The dialyser experiments tend to prove what all believe,—namely, that in winter epidemics the sewage, being warmer, floats on top of the river, which explains the persistence of the bacteria in the water fully.

Dr. E. C. Levy. Two years ago, at the Winnipeg meeting of this Association, Dr. Freeman and I presented a joint paper on "Typhoid Fever in the South," having made a study of this disease with particular reference to Richmond, Virginia. We made no attempt at that time to explain why it was that water typhoid was especially prevalent in the winter months, but we took the position unqualifiedly that such was the case. Our opinion was arrived at purely from an epidemiological standpoint, as we had no laboratory facts to corroborate this point. During the two years since that time our views have been confirmed in every way to such an extent that after we have passed the winter months we do not worry about water typhoid. We feel that summer typhoid in Richmond has prevailed independently of the water supply. There were two distinct small outbreaks with 74 cases in January and February, 1908, and only fifteen cases in the one of February, 1909, which were attributed by us to the public water supply.

The exact experiments which have been made by Dr. Ruediger throw light on this subject. There are still some points that need to be worked out. One of them is the puzzling fact that a city with a very polluted water supply and with winter typhoid due to that polluted water, does not, for some reason, appear to show the normal summer and fall increase that other cities show. A city with a polluted water supply may have less typhoid in the summer months than a city similarly situated in other respects, but with a purer water supply. Attention was drawn to this by Professors Sedgwick and Winslow. I wish to call attention to the fact that in the paper of Dr. Freeman and myself, referred to above, we hazarded an opinion which seemed rather bold at that time, namely, that polluted water in the South does not play the important part in typhoid epidemiology that it does in the North. This is the first paper confirming our conclusions by laboratory methods.

Dr. Ruediger. I do not think the factor of sedimentation enters into these experiments in any way. So far as I can see there would be as much sedimentation in winter as in summer. Because of the great distance the sewage would have ample chance to chill and settle. Water runs more quietly in the winter months when it is protected by ice from the wind. and hence sedimentation might be even better in winter.

Laboratory Section

THE RESISTANCE OF SMALLPOX VACCINE TO THE COAL TAR DISINFECTANTS.*

By CHAS. T. McCLINTOCK, M. D., Ph. D., and NEWELL S. FERRY, M. D., Detroit, Michigan.

It is well known that carbolic acid in amount sufficient to kill or prevent the growth of bacteria is a good preservative for smallpox vaccine. For some years the Japanese Government has used carbolic acid instead of glycerin as a vaccine preservative.

During some studies on the nature of smallpox vaccine, it occurred to us that it would be desirable to try out other of the coal tar disinfectants on vaccine virus. The vaccine used in all of these experiments was the same,—taken from one heifer. It was ground in a mortar, preserved in glycerin, and kept constantly in cold storage, so that one could be reasonably sure that the virulence would remain practically constant. For each experiment a small amount was taken, again ground in a mortar, diluted with about five times its volume of water, and then centrifugalized for half an hour at a speed of from 5,000 to 6,000 revolutions per minute.

The supernatant liquid, nearly clear, and resembling a dilute bacterial emulsion, was the part used in the experiments. By this method the emulsion was always fairly uniform and contained no microscopic particles, so it was possible for the disinfectant to come more readily in contact with the virus.

The disinfectant to be tested was put up in varying percentages and mixed with equal parts of the centrifugalized vaccine. By this method the dilution of the vaccine emulsion remained constant for each test. Another portion of the centrifugalized vaccine was mixed with equal part of sterile water and used as a control. All of these mixtures were allowed to stand at room temperature for five hours, being well mixed several times, however, during that period.

Tests for activity of the vaccine were made on mature guinea-pigs of about 350 grams weight. The scrotum and lower abdomen were shaved, scarified, and vaccinated in the usual manner. Control pigs were used in every experiment and always gave good takes, showing the activity of the vaccine.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

The virulence and ability to resist the destructive power of heat and chemical agents vary greatly with different lots of vaccine, depending on age, manner of production, and other factors; so that our figures, while correct for the lot of vaccine used and under the conditions it was used, would vary with another lot of vaccine or in the hands of another experimenter.

The entire series of experiments and all the details were carried out by the same individual, in order that there might be no variation in the technique. The tests upon each disinfectant were repeated several times, so that we are quite sure the figures are correct for the lot of vaccine used.

The following products were tested with vaccine, with the percentage given at which they did not kill.

Carbolic acid	½%
Zenoleum	½%
Trikresol	½%
Kreso	½%
Cyllin	1-12 %
Lysol	½%
Cresylone	¼%
Disinfectant No. 1	1-10 %
Disinfectant No. 2	1-12 %
Kreso with Beta Napthol	below 1-12 %
Creolin	½%
Cofectant	below 1-12 %
Izal (Cooks)	below 1-12 %
Cresol—Ortho	½%
Cresol—Para	¼%
Cresol—Meta	¼%

SUMMARY.

It will be seen from the table that the large majority of the coal tar disinfectants (carbolic acid, cresols and the like) do not destroy the virulence of vaccine virus in ½% solutions at five hours' exposure, while with this strength and length of time it is probable that these disinfectants would destroy all non-spore-bearing bacteria.

It will be noted that there are several exceptions in the table, wherein the vaccine was destroyed. We are at a loss to explain these results. Coal tar, from which these disinfectants are obtained, is a very variable material, and in the exceptional cases it may contain things other than carbolic acid and the cresols.

As the purified carbolic acid and cresols, as well as most of the cruder commercial disinfectants containing these substances, fail to destroy vaccine virus, we believe the inference is allowable that this class of disinfectants is not safe to use after diseases such as smallpox and the presumably protozoal diseases, such as syphilis, measles, scarlet fever, etc.

REPORT OF COMMITTEE ON STANDARD METHODS FOR THE DIAGNOSIS OF RABIES.*

The Committee appointed to recommend a standard method for the diagnosis of rabies respectfully submit the following report:

The most striking feature of rabies, in the dead animal, is the absence of recognizable gross tissue changes. This restricts the diagnosis to the microscopic findings or to other laboratory methods. As the diagnosis of the disease is to be made in the laboratory, the method consists of two parts: (1) the procuring of the suspected animals in a condition suitable for diagnosis and (2) the technique employed.

(1) The results of the numerous investigations into the nature and diagnosis of rabies have demonstrated that all the structures necessary for a positive diagnosis are included in the brain and the nerve ganglia of the head. This necessitates sending to the laboratory the head only of the suspected animal. The head should be removed close to the body, PACKED IN ICE, and sent directly to the laboratory as quickly as possible.

(2) The laboratory diagnosis of rabies is restricted, for all practical purposes, to three procedures, namely:

a. Inoculation of experimental animals.

b. The determination of the changes in the ganglia as described by Van Gehucten and Nelis.

c. The presence of Negri bodies.

(a) In the animal inoculation method rabbits are to be preferred, although guinea pigs may be used. They should be inoculated with the suspected brain, preferably subdurally, although intraocular and intramuscular inoculation cannot be entirely excluded. The diagnosis by this method is not recommended, except in case of failure by the other methods, and where a late determination will be of value.

(b) The diagnosis by means of the changes in the Gasserian ganglia, described by Van Gehucten and Nelis, has proved to be very satisfactory where the suspected animal has died or was killed in the late stages of the disease, or when Negri bodies cannot be found, or cannot be looked for because of destruction of brain, putrefaction, etc. When sections are made from the ganglia removed during the first stages of the disease, the apparently specific lesions are often absent or not sufficiently well marked to warrant a diagnosis. The technique required for this procedure is simply that of ordinary pathological histology. The changes may be of two kinds:

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

(1) THE TYPICAL, OR FOCAL LESIONS. These are characterized by the partial or complete destruction of the ganglion cells, their place being occupied by cells of the endothelial type. The foci may consist almost entirely of cells of the endothelial type, but often associated with them are mast cells, lymphocytes, plasma, and connective tissue cells, and polymorphonuclear leucocytes.

(2) THE ATYPICAL, OR DIFFUSE LESIONS. These are characterized by a more or less general infiltration between the ganglion cells and nerve fibers of cells of an endothelial origin and the various cells which are associated with chronic inflammatory processes. These changes are usually associated with the typical lesions.

The lesions in the ganglia may be very extensive, involving the entire ganglion, or they may be restricted to a single ganglion cell here and there in the organ. The lesions may be present in one ganglion and not in the other. It is sometimes necessary to examine a number of sections before finding the changes.

(c) The diagnosis by the presence of Negri bodies: The numerous examinations and investigations that have been made since 1903 to confirm the discovery of Negri that the bodies which he described possessed a diagnostic, if not causal, relation to rabies, have been practically unanimous in their affirmative findings. We feel justified, therefore, in asserting that the presence of Negri bodies is sufficient evidence on which to diagnose the disease. The results of the different investigations also indicate that the Ammon's horn is the place where these Negri bodies are most constantly present, and therefore the part of the brain to be first examined for them. If they are not found there, an examination should be made of the cerebrum and cerebellum. Those who have worked with these bodies have found that they are not especially difficult to stain or to detect on microscopic examination. Several methods of preparing the material for examination have been suggested, and in the different laboratories where the diagnosis of rabies is being made, slightly different technique is employed.

In formulating a method to be recommended to all laboratories, it does not seem within the province of this Committee to accept or to reject any of the technical methods which are giving excellent results in the hands of certain workers, but which are not employed by others. The failure of any of the procedures about to be given depends, apparently, more upon the worker than upon the method.

Because of the excellent results obtained by different technique, the Committee recommends as a procedure in diagnosing rabies from suspected animals sent to laboratories for that purpose, the following: namely,

1. Examine for Negri bodies, and, if they are found, report the disease as positive.

2. If Negri bodies cannot be found, examine the Gasserian ganglia for cellular lesions.

3. If the results from the examination for Negri bodies and ganglion changes are negative, rabbits should be inoculated in those cases where a late diagnosis will be of value. Otherwise, animal inoculations should be omitted.

Examination for Negri bodies: At least four preparations from each of the hippocampi, four from each of the cerebra, and four from the cerebellum, should be carefully examined before pronouncing the case negative. In making the preparations for examination any one of the following three methods may be employed.

(a.) Smear preparations as described by Dr. Williams, of the New York City Board of Health Research Laboratory.

(b.) Impression preparations as described by Dr. Frothingham, of Harvard University.

(c.) Fixing the tissue and making sections.

Either of the first two methods is preferable to the last, although occasionally the Negri bodies seem to be more clearly differentiated in the section. Zenker's fluid is recommended for fixing the tissue. It does not seem to be necessary to fix for more than from four to six hours when the tissues are cut in thin pieces.

The stain to be employed for smear or impression preparttions should be either Van Giessen's, or eosin and methylene blue. If the tissue is fixed in acetone and sectioned, the staining method recommended by Mann or that proposed by Lentz gives excellent results. If the tissue is fixed in Zenker's fluid, eosin and methylene blue should be used.

It is understood that in the application of any of these methods, the greatest care should be taken relative to the preparation, stain, the time of staining, and the variation in the number and location of the Negri bodies in the brain. Experience has shown that cases of rabies are exceedingly rare which cannot be diagnosed accurately by the search for Negri bodies. As a precaution, all reports that are negative on microscopical and histological examination should state that if the animal was believed from its action to have had rabies, the persons bitten should be warned of their possible danger, in order that they may take the preventive treatment if they so desire..

V. A. Moore, Chairman.
D. L. Harris
H. C. Ernst,
W. L. Beebe,
J. J. Kinyoun.

Section of Municipal Health Officers

QUARANTINE OR ISOLATION IN SCARLET FEVER, WHICH?

By FRANCIS GEORGE CURTIS, M. D.,
Chairman, Board of Health, Newton, Mass.

In making an intelligent campaign against any communicable disease, some knowledge of the cause of the disease and of its method of transmission from person to person is necessary. In all those diseases in which there has been a marked advance in methods of control, and in which there should be a marked diminution of occurrence, we have this knowledge; but in the case of scarlet fever we have no such knowledge to assist us in the struggle to control it, and the best that can be done is to follow out such lines as experience has shown are most efficient. We know practically nothing about the true etiology of scarlet fever, we are unacquainted with the nature of the specific organism which causes it, and we are ignorant of its method of transmission from person to person, whether it is by means of the scales of desquamation or by the various excreta.

This question of the method of transmission of infection in scarlet fever is one which is of great importance, for until the method has been satisfactorily determined, our efforts to control its spread must be at best empirical.

There are many theories as to the site of the contagion, and also many as to the method of its transmission from the sick to the well. Perhaps the most time-honored belief is that the contagion lies in the scales of desquamation and is transmitted by that means, and that as long as desquamation continues, so long is the patient dangerous and to be restrained; and that when desquamation ceases, the patient can be safely released.

There are a number of facts that seem to contradict the truth of this theory. Cases of scarlet fever without eruption are capable of producing typical scarlet fever in others. Here, of course, there are no scales which can be considered responsible for the spread of contagion. Again, we frequently find cases of scarlet fever where one member of a large family is in active desquamation at the time of discovery, where no isolation of the sick child has been attempted, and yet the other children in the family

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

escape. Instances have been known where children have presented their playmates with fragments of skin as souvenirs, without any apparent untoward results. There is a large and steadily increasing number of observers who are skeptical in regard to the scales being the chief method of transmission of contagion, and some even go so far as to doubt whether the scales transmit contagion at all.

Le Sage believes that the discharges from the mouth and throat are the means of spreading scarlet fever, and believes that desquamation has nothing to do with it. He claims to have caused scarlet fever in the human subject by inoculation with the buccal discharge, and to have failed to cause it by inoculation with the scales. He also asserts that the patient may be safely released from detention at the end of what he calls the "throat cycle," which he states lasts about 15 days. This is a much shorter period of danger than is given by any other observer.

Dr. Moore, Medical Health Officer of Huddersfield, England, advocates disregarding desquamation altogether and the releasing of patients if the nose and throat are normal. He claims thus to have reduced the average stay in hospitals from 44.3 days to 29 days.

For a long time it has been the custom to hold under observation patients who have finished desquamating but who have a discharge from the ear or from a suppurating gland, and gradually the custom of continuing the period of observation on account of a discharge from mucous membranes has extended, until in many communities it is customary to hold patients in restraint if they have any discharge from the ear or nose. Out of 33 cities in the United States and Canada, where the information was secured, 14 take the cessation of desquamation as a sign that the patient can be released from restraint with safety; the others continue the restraint until all nasal and aural discharge has ceased.

During the past year the writer has seen one case where a vaginitis seemed to be the cause of a second case. Careful investigation failed to show any other cause of infection. Other observations have shown that patients with a nasal discharge, but free from desquamation when released, invariably caused other cases within a week; while patients not free from desquamation, but without a nasal discharge, did not so cause other cases. It is safe to say that the cessation of desquamation is not the true sign of freedom from danger and that we must hold cases under restraint until all discharges, whether from mucous surfaces or from wounds, have ceased.

The belief that scarlet fever can be transmitted from the sick to the well by fomites, or by a third person who has not the disease himself, has long been held, and is the foundation of many of our rules governing the

control of members of a family where scarlet fever is present. In spite of many apparently well-authenticated examples of the transmission of scarlet fever by such means, it is fair to assume that it resembles many other communicable diseases in this respect, and cannot be so transmitted, except within a very short time after exposure and under certain easily preventable conditions.

In a recent paper on "The Importance of Contact Infection,"* Dr. Chapin, of Providence, has drawn attention to the carelessness of persons who come in contact with communicable diseases, a carelessness to which many instances of the transmission of infection is due. The experience of the Pasteur Hospital in treating communicable disease without many instances of cross infection, by simply observing aseptic precautions, proves almost conclusively that by care the danger of transmitting scarlet fever by means of a third person may be practically eliminated.

If we admit that the naso-pharyngeal secretions in scarlet fever are capable of transmitting infection, and we must admit it, then we must grant that it is possible for a person who has recently touched such discharges, and neglected to wash his hands after so doing, to transmit the disease to others for a short time after contact. It also follows that a proper cleansing of the hands and clothing will render such a person harmless. There are many light, unrecognized cases going about freely. In the free interchange of articles from mouth to mouth which takes place among children, infection can be easily passed from one to another. The custom of taking alternate sucks from a favorite style of candy known as "all day sucker" is an example of this method. It is by such means as these that the cases which were formerly attributed to fomites are undoubtedly transmitted. The theory that any communicable disease can be carried from the sick to the well by fomites is a very convenient manner of accounting for its spread, and it is also one which saves much work. It is far easier to assume that something must have carried the infection to the new case than it is to investigate the conditions carefully and show that it is due to personal contact with an unsuspected case.

For how long is a patient with scarlet fever dangerous to others? This is a very important question, and one in regard to which there are many opinions. The period of quarantine varies from two to six weeks in those cities which have a fixed period, but fully half of those asked have no fixed period.

In July, 1899, Cutler, of Boston, in a paper on "The Incubation and Infectiveness of Some Contagious Diseases,"† said: "Scarlet fever is

* Am. Jour. Pub. Hygiene, Vol. VI, No. 3, p. 742.

† Jour. Mass. Assn. Boards of Health, Vol. IX, No. 3, pp. 93, 94.

infectious from the appearance of the earliest symptoms, and until desquamation has ceased and all signs of inflammation of the mucous membrane shall have passed away." In concluding, he says, "The period of isolation should be seven weeks from the appearance of the eruption; desquamation should have ceased, the nose and throat should be healthy, and all complications should be over." Forscheimer, in the "Twentieth Century of Practice," says that it is not safe to release the patient before the termination of the sixth week. The so-called primary desquamation is finished in about four weeks, and it is safe to release a patient at the end of that time, provided the nose, throat, and ear, are normal.

It seems that the best plan is to have no fixed period of quarantine, but allow the patient to be released when primary desquamation has ceased, and there is no sign of discharge from the nose, throat, or ears.

In the opinion of the writer, even primary desquamation has nothing to do with the transmission of infection, and the patient may be released as soon as the mucous membrane becomes normal. It is very clear that in dealing with scarlet fever we are confronted with a disease of uncertain origin, and one of which the method of transmission as well as the duration is more or less uncertain. We must devise some means of dealing with it, which, while effective, will entail as little discomfort upon the family of the patient as is consistent with efficiency.

The questions to be decided are: What shall be done with the patient? What shall be done with the adult members of the family? What shall be done with the other children of school age? The ideal way of answering all these questions is by the removal of the patient to a hospital as soon as the diagnosis is made. By so doing we remove a focus of infection at once, allow the adult members of the family to continue their avocations, and interfere as little as possible with the education of the other children; in fact, the advantages of this method are so obvious that it seems unnecessary to do more than mention them. Unfortunately, however, there are cases where it is impossible so to remove the patient, and it is these cases that must be considered. The commonest method of treating such cases is by the segregation of the whole family during the continuance of the disease. This method, which may be called the method of quarantine, evidently has its foundation in the belief that a third person can transmit the disease.

Eleven cities in the United States of over 100,000 inhabitants, out of nineteen that replied, state that it is the custom to segregate the whole family during the continuance of the disease if the patient remains at home, and for a varying period after recovery and disinfection. This

custom appears to inflict an unnecessary hardship upon the well members of the family, without giving a corresponding benefit to the public at large.

In the opinion of the writer, the isolation of the patient is the preferable method. Under proper direction and supervision by the medical inspector this home isolation can be made perfectly effective, and when this is accomplished there is no necessity of segregating the other members of the family. Let it be understood that any violation of the orders of the medical inspector will be followed by a strict quarantine of the whole family, and there will be little trouble about having the orders obeyed. Of course the inspector must make frequent and unexpected domiciliary visits to see that his directions are carried out. If we once discard the idea of the transmission of contagion by fomites, the problem of proper isolation at home becomes simple. It is a very poor house that has not one room which can be used as a sick room, and the passage through the door must be forbidden to everyone but those whose business takes them there.

The nurse or attendant must understand that she can prevent the transmission of contagion by proper care, and what is fully as important, that she can and will spread contagion by carelessness. When she leaves the sick room she must leave her outer clothing IN the room, wash her face and hands carefully before passing out, and then put on her other clothing. In this way there will be no danger of contact infection, and it will be safe for her to go out. The excreta should be treated with one of the many disinfecting agents before removal from the room. Soiled linen may be enclosed in bags and boiled, bag and all, before being washed. Dishes and similar articles used by the patient may be boiled in the room, or immersed in hot water before removal from the room, and then taken out and boiled. By such isolation the well members of the family cannot become carriers and may be permitted to go about freely.

The treatment of the children of school age is a more difficult problem, as scarlet fever is essentially a disease of childhood, and the majority of cases occur during the school age. It is almost universally customary to exclude the well children from school during the continuance of the disease, and for a certain time after the recovery of the patient; in fact in many states such exclusion is required by law, provided the children remain at home. In Massachusetts they are permitted to return to school when the board of health certifies that they are free from danger of conveying contagion. This is a very excellent provision, as it permits the local board of health to exercise its judgment in regard to excluding the well children from school. Where the isolation is satisfactory to the medical inspector, there seems to be no reason why the well children should not be allowed to continue at school even though they remain in the house.

Under an efficient medical inspection of schools, the children may be allowed to return to school at the end of a week from the occurrence of the first case. This observation period will give time for the appearance of the disease, should any of the well children have been infected by the first case before isolation has been enforced. At the end of that period the children may be allowed to return to school upon the certification by the board of health that the isolation of the case is satisfactory. The school physician should, of course, pay careful attention to any such children, watching for any untoward symptoms. By such a system the danger of infecting others can be practically eliminated. In communities where there is no medical inspection of schools, there is slightly more danger in allowing the well children to return to school during the continuance of the disease, but with careful isolation and supervision it can be done with safety.

In conclusion, it appears from our present knowledge, that scarlet fever is a disease that is transmitted by contact and not by fomites; that the scales of desquamation play very little, if any part, in the transmission of contagion, the chief danger lying in the buccal, nasal, and aural secretions; and that the release of each case should be decided upon its merits.

As in all communicable diseases, it is better to remove each case to a hospital, but should this be impossible, it is better to isolate the patient and allow the other members of the family to continue their regular vocations, educational and otherwise, as long as the isolation is maintained to the satisfaction of the board of health.

Section on Vital Statistics

TUBERCULOSIS IN IMMIGRANTS.*

By Dr. P. H. BRYCE, M. A., M. D.,
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The remarkable migration of European peoples to this continent during the past century, and most of all during the past decade, has created many problems,—economic, social, moral, and physical,—which give much food for thought, and in many urgent instances demand governmental, municipal, or social action for their solution. This Association at one time was supposed to concern itself chiefly with the question of dealing with those results of this immigration which affect directly the physical condition of the countries represented in our organization, but so interwoven are the subtle threads which make up the life of man, that it is quite impossible to study so seemingly simple a problem as that taken for the title of this paper, without dealing with the political, economic, social, and moral phases of the immigration question.

Several years ago the National Canadian Association for the Prevention of Tuberculosis discussed the question of tuberculosis in immigrants, and I was asked to prepare a paper on the subject. I did so, with the result that in 1908, after collecting all the data available from boards of health, hospitals, and public institutions in Canada, I obtained the following results:

That year the number of tuberculosis immigrants deported was only 39, while for the year ending 1909-10, the total number deported was 30. An examination of hospital returns for the past year from the three provinces, Manitoba, Saskatchewan, and Alberta, gave only 9 tuberculosis cases in 319 cases of various diseases for which the Department paid, as they had been in Canada under one year. So it will be apparent that in a year during which 208,794 immigrants came to Canada, the available records show that very few immigrants became patients in hospitals, or becoming public charges, were deported. It will be proper to add to this list the number detained at seaports on account of suspected tuberculosis who were

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

finally either debarred or admitted to Canada. The paucity of the tuberculized immigrants thus illustrated by Canadian statistics is further illustrated by the figures supplied from the port of New York during the year ending June 30, 1910, by my friend, Dr. G. Stoner, Chief of the Marine Hospital Staff at Ellis Island. They are as follows:

Thirty-two cases of tuberculosis were certified to at the port of entry; but of similar affections, such as lupus, inflammation of the lymph glands of the neck, inflammation of knees, and joints, there were nearly 400, and the majority of these were deported by the immigration officials.

The result will not surprise those who understand what the organized methods of immigrant inspection include. For instance, a Russian immigrant undergoes inspection on arrival at the German border by both Russian and German medical officers. Last year (1909) 7,020, for various causes, were refused admission to Germany. Arriving through 14 border stations, those admitted to Germany are assembled at Ruhtchen, near Berlin, and are again medically inspected and forwarded to some one of a half dozen seaports, where they are carefully housed and inspected daily prior to embarkation. Indeed, on the day of embarkation each emigrant is inspected by three separate medical officers of the emigration barracks, the medical officer of the Board of Trade, and the medical officer of the ship. For at least seven days these emigrants are under observation on shipboard, and, finally, are individually inspected by one or more medical officers at a Canadian or United States port. A procedure similar to that carried out at German seaports is carried out at British and at Italian seaports.

It is apparent, therefore, from what has been stated, both as regards statistics and methods of inspection, that remarkably few tuberculized immigrants have entered either country for a number of years past. This season a double line of inspection at Quebec has pushed the investigation further, and suspicious persons are detained and specially examined with results as set forth in the following table:

	Age and Sex	Nationality	Deported or Admitted	Bacilli in Sputum, or Cough	Tuberculin Test	Able to Work	Occupation
1. F. Fincham	18F	English	Deported	B. in sputum	....	No	Cotton factory operative
2. E. J. Forbes	16F	English	Died in hospital	B. in sputum	....	No	....
3. M. Reece	17F	English	Admitted on bond	Cough	Positive	....	No occupation
4. Fannie Kahler	25F	English	Deported	B. in sputum	....	No	Domestic
5. Jas. Hands	38F	English	Deported	Cough	Positive	....	Laborer
6. Jas. Smedling	28M	English	Admitted Condit'n'ly	....	....	....	Clerk
7. Albert E. Skeet	25M	English	Deported	Advanced Consumption	....	....	Bank clerk
8. A. Turnbull	36M	Scotch	Deported	B. in sputum	....	....	Coal heaver
9. T. W. Gray	28M	English	Deported	B. in sputum	....	....	Nickel polisher
10. W. O. Pilson	26M	English	Deported	B. in sputum	....	Sick 1 yr.	Missionary
11. M. A. Kinkaid	17F	Scotch	Admitted	Cough	Positive	....	No occupation
12. Sam Black	37M	Irish	Deported	Very emaciated; no cough	Positive	....	Overseer in flax mill
13. Wm. Moseley	24M	English	Deported	....	....	....	....
14. Harry I. Earl	26M	English	Deported	Looked sick; cough	Positive	Poor physique	Laborer
15. Wm. Wilson	24M	English	Died in hospital	Pneumonia on ship; B. present	....	....	Plumber
16. Jas. Beire	22M	English	Deported	....	Positive	....	Fitter
17. W. Andrews	26M	Irish	In hospital	B. present	....	....	Commerc'l tr'v'r
18. M. Peplow	40F	English	Deported	B. present 3d stage	....	Sick over a year	Housekeeper
19. Alb. H. Cook	21M	English	Deported	B. present	....	....	Miner
20. Thos. Smith	17M	English	Still in hospital	Cough	Positive	....	Laborer
21. Wm. Cameron	22M	English	Deported	Had hemorrhage on ship	....	....	Bank clerk
22. Jas. McCabe	24M	Scotch	Still in hospital	Emaciated with cough	Positive	....	....
23. S. McGimpsey	19M	Irish	Still in hospital	....	....	....	House painter

It might be thought that with such a showing, I, as a medical officer of the Immigration Service of Canada, should be satisfied, and thus leave the matter; but the problem of tuberculosis in immigrants has today advanced to a further stage, and become a state and municipal health question which enters into all economic, social, and charitable questions, and demands much further consideration.

At the Congress on Tuberculosis in Washington in 1908, two somewhat remarkable papers were read, one by Dr. Maurice Fishberg, physician to the United Hebrew Charities of New York, on "Tuberculosis among the Jews," and one by Dr. Antonio Stella, of New York, on "Tuberculosis among Italians in the United States." These valuable papers are so well known that I shall refer only to such data in them as are pertinent to my subject.

Dr. Fishberg refers to the long-observed fact of the relatively small amount of tuberculosis amongst the Jewish race and discusses race immunity, inbreeding, the Kosher meat theory, and freedom from alcoholism; statistics prove that all of them enter but little, if at all, into the problem. He afterwards stated what to me is a very important scientific conclusion, containing as it does a sanitary lesson of the greatest possible meaning and value to all sanitary workers. He says: "Be that as it may, we know that on the whole tuberculosis displays no racial preferences. Within certain limits, depending on social conditions, the white, black, yellow, and red divisions of mankind are attacked by this disease in the same manner; and the variations observed in the frequency, type, and course of the disease in different groups of people are alike traceable to the same causes, irrespective of racial affinities. We know that the variations displayed by the various social groups of white humanity, such as the difference in the incidence of the disease between city and country dwellers, rich and poor, those engaged in indoor or outdoor occupations, those active in a dusty atmosphere as compared with such as are working in clean, airy shops, and the like, are just as great and often greater than the difference observed in the white, black, red, or yellow races.

"As I will show, these differences are due to social conditions and not to racial causes. * * * * * the incidence of tuberculosis among Jews depends more on their economic and social environment than on racial or natural affinities." Speaking of its prevalence in the Jews in New York, Dr. Fishberg says: "The Jews in the lower East Side are more orthodox, more strictly adhering to their faith and traditions, and still have a proportionately higher rate of mortality from tuberculosis than their co-religionists in Harlem, who as is characteristic of Jews all over, with their prosperity have more or less discarded many of their religious practices, the first of which consists in consuming meat not prepared according to the dietary laws."

In the paper of Dr. Stella it is pointed out that in 1890 the United States had only 182,500 Italians, while in 1908 the City of New York alone had 500,000, or 75% of the total population in that state, of whom nine-tenths were of the agricultural peasant class. Stella first points out that in Italy the deaths from tuberculosis were 1.64 per 1,000, but in Calabria, whence come most of the immigrants, the rate was only 0.9 per 1,000; but in New York the rate was 2.76 per 1,000 in 1906, compared with 1.49 for the whole city in the 1900 census. But as Stella says, "if this rate in New York should not appear so very excessive, I would direct you to the fact that only a certain portion of the Italian tuberculosis popula-

tion die in the district in which they have contracted the disease. Men and women in very destitute circumstances will sell all their belongings and without second thought start to their native towns."

Since the Medical Department of the Italian Commission d'Imigratione began to keep records in 1903, it has been found that "the proportion of tuberculous immigrants returning to Italy from North America has been increasing steadily every year."

In 1903 the proportion was	2.92 per 1,000
In 1904 the proportion was	2.75 per 1,000
In 1905 the proportion was	5.66 per 1,000
In 1906 the proportion was	5.61 per 1,000

"But this average only takes into account the advanced bedridden steerage passengers,"—so many return second and even first class to avoid supervision, and for social reasons, that Dr. Stella ventures the statement that 50% of the returning second-class passengers are suffering from tuberculosis. In 1906 the Italian reports showed 81,412 immigrants to have returned home, of whom 2,477 were sick, and of whom 441 had tuberculosis. Compare this with the fact that of 309,503 emigrants who left Italy for the United States in 1903 and 1904, there were only two cases of tuberculosis treated in the soip's hospiital, while amongs, 169,729 homeward bound from the United States during the same two years, there were 457 in hospital on ship, besides 17 who died at sea. Yet more exact in their bearing upon the problem we are considering are the details of a series of 800 cases specially studied by Dr. Stella on the basis of the number of years in America before the cases came to his notice. They were as follows:

Average from Arrival	From 1 to 3 Years	From 5 to 6 Years	From 6 to 10 Years	Total
Women..........	95	340	140	481
Men.............	74	87	155	319

Allowing for the usual anomalies in the sex and age of patients coming under the medical care of a single physician, the figures are valuable, since, as Dr. Stella says, "the shorter period (from one to three years) applies chiefly to young girls employed in tobacco factories, to seamstresses at home, and to young dressmakers or tailors. Two or three years of this existence in the workshops or tenement houses of New York are enough to render this human material a fertile soil for the growth of the tubercle bacillus."

"From the study of the 800 cases it results that about one-half (162 men, 230 women) had come to America when between fourteen and twenty-five years of age, being perfectly healthy at the time of their arrival * * * * * * but the changed and execrable surroundings, the unwholesome and crowded dwellings, the long hours spent in the factories, and the thousand privations imposed by poverty and the insane desire to save money,—all of this coupled with the overwork which is kept up until utter exhaustion, without the resistance obtained from food, proportionate to the demands of the exaggerated tissue waste and rapid growth of this period of life, shows only too clearly why so many youthful lives in America fall an easy prey to tuberculosis."

I find nowhere a more exact description of the conditions under which European immigrants who settle in the industrial centres of this continent are allowed to live; a more accurate statement of their living conditions would necessitate the study of the problem from the view-point of the immigrant. Everywhere we find America being held up to the people of Europe as the land of opportunity, where labor is abundant and its remuneration adequate. Dr. Fishberg estimates that 35% of all immigrant Jews in the United States are garment workers, and he points out the physical type of the sweatshop worker. Here in Canada we are rapidly coming to know the type, since in Montreal alone it is estimated that there are over 40,000 Jews, most of whom are engaged in this same class of work of which the Jewish manufacturers there proudly claim to have a monopoly. They have brought the practice with them from Europe and are not likely to change.

But though this be true, it does not alter the fact that it is ourselves, who through "*laissez faire*" permit Ghettos to grow up, and allow the competition of such cheap labor to make rapid and certain, the physical and moral degeneration not only of the immigrant, who comes asking only to be allowed to labor, but also of the whole class with whom he comes into competition.

We, in Canada, have at any rate recognized that it is to the land we wish our immigrants to go, and we have succeeded in a large degree in directing the newcomer to our agricultural lands, both in the old Provinces and in the newer territories. But this work of preventing urban degeneration, whether in the United States or Canada, must be taken up and dealt with on as systematic and business-like a scale as is the emigration propaganda in the cities and countries of the Old World. We see organizations being developed in Chicago and elsewhere for promoting the settlement of town dwellers on western irrigated lands and southern rice-fields; but my observation during the last twenty years has taught me that this

most vital of all social and sanitary questions will not be solved until the large civic centers of this continent shall have evolved a higher sense of municipal responsibility. While making municipal building regulations and town-planning schemes so practical and effective that overcrowding may be prevented by tenements, erected both by municipal and local philanthropic agencies, which if small and cheap are yet sanitary, they should further realize that organized civic schemes for settling the surplus population in the neighboring agricultural lands of their district will prove equally a social benefit, with many elements of financial success. What are now called "garden cities" in Europe are being established, as the beginning of a system which will begin to meet the demands of modern industrial conditions such as are found in England. If, on the one hand, steam and electricity have created the modern city and its problem, on the other, it is to the same agencies of rapid transportation that we must look for the solution of the civic problem of overcrowding; and we owe it to ourselves and yet more to the helpless foreigner who comes to us that we shall make life for him not more intolerable than in those eastern lands which we are inclined to believe effete.

The Massachusetts Association of Boards of Health

APRIL—QUARTERLY MEETING
Boston, Massachusetts

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, April 27, 1911, Dr. Henry P. Walcott, President, presiding.

Dr. Field having resigned as Treasurer, a nominating committee of three, consisting of Dr. Woods, Dr. Arms, and Mr. Underwood, was appointed by the Chair. On motion from the floor, this committee brought in the name of Dr. F. G. Curtis, and Dr. Curtis was unanimously elected Treasurer of the Association for the remainder of the present year.

REPORT OF COMMITTEE ON TYPHOID FEVER

At a previous meeting of the Association it was voted that the Committee on Typhoid Fever confer with the State Board of Health in regard to better means of controlling the spread of typhoid fever. In accordance with this vote the Committee entered into correspondence with the State Board of Health, and the latter made arrangements for a conference which was held on March 2. The following recommendations were made by the Committee at the conference:

1. It is recommended that the State Board of Health send circulars to all physicians of the state, giving information in regard to typhoid fever, the methods of diagnosis, the new facilities for making bacteriological diagnoses offered by the state, methods of prevention, disinfection of excreta, vaccination, and similar subjects.

2. It is recommended that the State Board of Health require all local boards to send an agent to every case of typhoid fever within forty-eight hours after it is reported, for the purpose of seeing that the case is properly isolated and the stools and urine disinfected. The agent shall also investigate the source of infection of the case, determine the source of the water and milk supply, see whether milk is produced on the premises, and secure such other information as the State Board of Health may require. This information is to be recorded on blanks furnished by the State Board of Health, a copy of which is to be sent at once to the state inspector of that district.

If the State Board of Health feels that they have not authority to require local boards to send an agent to every case of typhoid fever for the purpose of giving instructions, or doing necessary work, or if a request to the local boards is not likely to have any effect, then the next legislature should be asked to pass a law, prescribing as one of the duties of local boards the sending of an agent to every case of typhoid fever, for the purpose of seeing that proper precautions are taken, and to

obtain such information concerning the case as the State Board of Health shall require.

3. It is recommended that the state inspectors devote more of their time to typhoid preventive work. With the reports of all cases of typhoid fever in his district before him, the district inspector would be in a position, while in his own office, to trace the origin and relation of certain cases of typhoid fever which would not be apparent to the local boards. He would be able to recognize some epidemics at an earlier stage; he would be better able to decide where investigation on his part was most needed, and where his work would count for most.

The state inspectors should investigate that part of the work of local boards relating to typhoid fever and assist in making inspections whenever requested by the local board, or whenever they deem the local boards inefficient.

It should be an invariable rule that the state inspectors should visit every case of typhoid fever on a milk farm, or where the patient has any connection with milk which is sold outside the town. Such a case is not of mere local concern, and the management of that case and the sale of the milk should be regulated by the State.

4. It is recommended that the State Board of Health send a circular in regard to typhoid fever to every local board, giving them advice in regard to the preventive measures which they should employ in every case of typhoid fever.

5. It is recommended that the State Board of Health make an investigation of typhoid fever similar to the present investigation of infantile paralysis. Such an investigation should be in charge of some well-trained young man who would give his whole time to the work. He should have the assistance and co-operation of the district inspectors. Such an investigation, for which the next legislature should be asked to appropriate ten thousand dollars, would be certain to show more effective means of preventing the disease.

The State Board of Health gave their assurance of entire sympathy with the suggestions made by the Committee, and stated that they would endeavor in every possible way to make these suggestions effective. The State Board of Health, however, have not statutory authority to require local boards to send an agent to every case of typhoid fever, as recommended in Section 2. The Board is intending to provide in the immediate future for the bacteriological examination of blood, feces, and urine, in cases of typhoid fever, or suspected typhoid fever, and the legislature has just given an increased appropriation for this specific purpose. They also expect to undertake an active educational propaganda for boards of health and physicians, and as rapidly as they may be able, to increase the efficiency of the state inspection service.

C. V. Chapin, Chairman.
D. D. Brough,
W. H. Davis,
M. W. Richardson,
M. V. Rosenau,
G. S. Tobey,
F. P. Denny, Secretary.

By vote of the Association the report was received and forwarded to the State Board of Health.

DISCUSSION.

Professor Sedgwick. Twenty years or so ago we were in a period of great epidemics in this state. Under the leadership of the State Board of Health good work was done in studying these outbreaks of disease and in taking steps for their prevention in the future. It may interest the Association to know that Canada has just reached the former stage. The city of Ottawa has recently experienced an epidemic of twelve hundred cases of typhoid fever, Toronto not long ago had a very serious epidemic of this disease, and Montreal has also suffered severely.

It does not follow, however, that because Massachusetts has always led in public health work she can afford to stand still, even as to typhoid fever, upon which so much work has been done here in Massachusetts. I, for one, welcome the conscientious work of this committee. The fact is that even now we have more typhoid fever in this state than we ought to have, and that it could probably be reduced one-half if the members of this Association would really follow out the recommendations of the State Board of Health and of this committee. That is a goal toward which we ought to keep on working. I greatly hope that the committee will be continued, and that it will report from time to time any progress that it may be able to make.

Some of the points in the report are of more than ordinary interest, such, for example, as the proposed requests, or orders, to local boards of health to do their whole duty in this matter. Obviously, the statutes do not allow orders; but I greatly hope that the State Board of Health will continue to use its powerful influence in repeatedly RECOMMENDING all these things to local boards of health. If that does not suffice, the State Board of Health, after a while, may say to the local boards that fall short: "We propose to publish the fact that we have made recommendations which you have not carried out." Even that amount of publicity would do a lot of good and would be, perhaps, quite as effective as any definite orders under statutory authority.

I greatly hope that the committee will be continued, to the end that we may still further reduce typhoid fever in this state and still more fully retain that leadership which this state has long had. I move that the committee be continued and requested to report progress at the end of six months. (Adopted).

The President. With regard to the previous action of the Association in referring the report of the typhoid committee to the State Board of Health, I should like to say that, so far as I can represent that body, there certainly is no impropriety in the communication, and that I consider it a very desirable one. The real authority of the commonwealth resides with the health boards which you gentlemen represent; the power of the commonwealth is in the local boards of health, and it depends absolutely upon how they do their duty as to how widespread a contagious disease becomes. On behalf of the State Board of Health, I very heartily welcome any suggestion which this Association sees fit to make to it.

REPORT OF THE COMMITTEE ON MILK LEGISLATION

There is only one bill before the legislature this year relating to milk which, if passed, would benefit boards of health, and that is House Bill No. 350. This is a very desirable bit of legislation to have enacted at the present time, because of the recent action of the Supreme Court in ruling that the Boston Board of Health exceeded the powers granted it by law when it forbade the sale of loose milk. This bill is really far more significant than appears on the surface, for the decision in question affects the validity of a great many other board of health regulations, and the bill referred to aims to remedy this state of affairs.

G. E. Bolling, Chairman.

The President. The following-named persons have been passed by the Committee as fit candidates for membership in this Association:

Dr. Paul Carson, Boston.
Dr. J. T. Spaulding, Mansfield.
Mr. William H. Dodge, Leominster.
Dr. Fritz B. Talbot, Boston.
Mr. J. V. Sampson, Newport.
Dr. Edward L. Drowne, Concord.
(Elected by unanimous vote of the Association.)

The President. On this occasion you have missed the face of one of the oldest, one of the most devoted, and one of the most intelligent members of this Association. I will therefore ask that you instruct your Secretary to make a minute upon the records of this meeting of the long, devoted, capable, and highly effective service of Mrs. Richards, who has met with us here from the beginning of the meetings of this Association, and whose loss we deplore greatly. (Carried.)

VENEREAL DISEASE AND ITS INFLUENCE.

By Dr. JOHN H. CUNNINGHAM, JR.,
Surgeon, Long Island Hospital, Boston; Assistant Surgeon, Boston City Hospital; Consulting Surgeon, First Hospital, Chelsea.

In this brief paper it is my desire to direct attention to certain features in connection with venereal disease. It is not my intention to discuss or even offer a tentative remedy for these conditions, or to touch upon the very broad fields of genetics and eugenics, or the social or moral questions connected with this subject. All other infectious and contagious diseases have received attention, and the results stand as a fitting tribute to such endeavors. More complex, and of far more importance, is the control of venereal disease.

The infectious and contagious diseases which are now handled by health departments are diseases which all attempt to avoid. Not so with venereal diseases, because they are associated with obedience to one of the strongest laws of nature. It is the group of medical men who make the treatment of venereal disease a specialty who have the best opportunity to know its frequency, the source of its propagation, its physical and mental effect upon the individual, and the part it plays in the unfortunate patient in respect to his relation to his associates, his family, and the community.

Public sentiment, based upon traditional usage and false modesty, persists in regarding venereal diseases as shameful and of immoral origin. Further, it avoids disseminating knowledge respecting their dangers. Facts must be admitted, and it is folly to deny the existence of conditions simply because we object to them.

Venereal disease not only injures the individual physically, but mentally, and morally. It may make its victim sterile. It is carried into the family, producing disease in the wife, and may result in an impairment of the production of the offspring by sterility or miscarriage. The children born of patients with venereal diseases are often diseased, which diseases may result in permanent invalidism of the child from the date of birth, or an inherited taint may be transmitted by it to future generations. Those with venereal disease are a menace to the health of the community, because they spread the disease to the innocent, and because a certain percentage must be supported by the state. That serious consequences result from infections of gonorrhea and syphilis, against which

infections no organized precautions are taken, does not need to be exaggerated to emphasize the important role which these diseases play in the welfare of the individual and the community.

The prevalence of gonorrhea in this country is estimated by different writers as varying between 50% and 95% in males. Statistics on this subject must necessarily be inaccurate, but all who have investigated the subject seem agreed that at least 50% of the male population of the United States have had the disease, one or more times, before the age of thirty—and the percentage is probably higher. Information with regard to the frequency of venereal disease is not easily obtained, because knowledge of these diseases is kept secret by the medical profession. Facts are valuable only in broadening the premises from which the deductions may be drawn.

In the Surgeon-General's report of the United States Navy for the year 1909, there are recorded the names of 7536 patients who were admitted for treatment for diseases of venereal origin. In this connection it must be noted that every prophylactic measure is imposed upon the men in the service, and failure to observe these is a punishable misdemeanor.

The Surgeon-General's report for 1904 states that by far the most important diseases affecting the efficiency of the army during that year had been those of venereal origin, which caused 16% of all admissions for illness, 28% of all known ineffectiveness, and 18% of all discharges for diseases. More careers were brought to an end from this cause than from any other. The number of syphilitics treated during the year 1904 was 1996, this disease standing fifth in the list of the diseases affecting the army, and in this list syphilis was preceded by gonorrhea, the total number of such cases being 7106. The report states that 70,398 days of duty were lost by those suffering from syphilis, and 146,609 days from gonorrhea.

Noeggerath (quoted by Morrow) estimates that out of every thousand married men in New York, eight hundred have, or have had gonorrhea, and the great majority of the wives of these men have been infected. While it is impossible to estimate accurately the percentage of individuals infected with gonorrhea, it remains without question that this disease is the most widespread and universal of all diseases affecting the male population.

Morrow* estimates that in the city of New York there are 200,000 syphilitics. Gerrish states that syphilis is one of the most common diseases, estimates its prevalence as about 10%, and says that 80% of the cases in the acquired form occur between the ages of nineteen and thirty-five. The number who are thus pre-

*Medical News, New York, No. 25, 1909.

vented from marrying, and the result produced by those who do marry, must exert an important influence on the welfare of the race. Moreover, the lowered vitality, whereby resistance to other diseases is lessened, must also be taken into account. It is generally believed that syphilis is more common among men than among women, and it has been variously estimated as from three to eight times as prevalent; that it is more frequent among the better class of men; and that the city populations are much more generally affected than those who live in the country.

In the Surgeon–General's report of the Army for 1904, the proportion of white enlisted men with syphilis was 27.83 per thousand; the proportion among the officers 2.78 per thousand. Morrow states that his observations, extending over several years at the New York Hospital, show that fully 70% of the women who came there for treatment of syphilis were respectable married women who had been infected by their husbands. Fournier has frequently stated that among the syphilitic women who came to his office, one in five is a wife infected by her husband.

The number of individuals who innocently acquire syphilis is large, much larger than gonorrhea, for the reason that commonly used eating and drinking utensils, cigars, pencils, dental instruments, telephones, and speaking tubes, and other articles with which the mouth comes into contact, may be easily infected by syphilitics having mouth lesions. Of the patients with syphilis who have consulted me in private practice during the past two years, twenty-four out of a total of sixty-nine were innocent infections—a percentage of 36% of innocent infections.

I have made an attempt to determine the prevalence of venereal disease in this community. The task I find to be an impossible one, because the charity patients are scattered, both in respect to the institutions, and in respect to the departments in these institutions. This percentage is relatively high, the consensus of opinion being that it is from 5% to 9%.

I have, however, a few facts to present. There are three large genitourinary clinics in this city, one at the City Hospital, one at Boston Dispensary, and a third at the Massachusetts General Hospital. There are numerous other charity clinics where men, and to a greater extent, women, are treated for venereal diseases and the consequences thereof. No estimate can be made of those with venereal disease who consult a physician privately. I find in the daily newspapers of Boston nine different advertisements which promise cure for venereal disease. I am informed on good authority that these offices do a very large business—one office making over $50,000 and another over $35,000 yearly for many

years. From this it may be seen that a large number of venereal patients pass through their hands. Naturally, we can obtain no data from this source. The fact that these advertisements guarantee to cure must play an important part in the propagation of venereal disease by disseminating a false feeling of security.

At the genito-urinary department of the Boston City Hospital last year, we treated 659 different men for venereal diseases. This does not in any way represent the number of male patients treated at this institution for venereal diseases and their consequences. Many male patients are treated for syphilis in the skin department, some in the medical department, and some in the eye, ear, and nose departments. Many have been operated upon for conditions which are the result of venereal disease, and others have been admitted to the medical side of the hospital for conditions the origin of which was venereal. The number of females with venereal disease treated in the gynecological department was 886. If there were no gonorrhea, the department would hardly be needed. The number of patients who apply to the Boston City Hospital for treatment for venereal disease, or maladies dependent upon it, cannot be accurately determined, because of their being scattered in different departments.

At the Boston Dispensary there were 1,552 men treated in the genito-urinary department alone. This does not represent the number of women treated for venereal disease or the number of men and women treated for syphilis or chancroids, because these patients were so distributed in the different departments that the number cannot be determined.

At the Massachusetts General Hospital last year there were treated 378 cases of syphilis, 304 cases of gonorrhea in males, 46 cases of gonorrhea in females, and 4 children with gonorrhea—a total number of 351 patients. There were 54 patients with chancroids of venereal origin.

The effects of venereal disease are far reaching. We cannot discuss at this time the sociological importance of venereal disease nor more than mention the economic factors associated with it. It seems best to confine our remarks chiefly to the physical effects produced.

MORTALITY. Gonorrhea is seldom mentioned as a cause of death. While the mortality from this disease, *per se*, is practically *nil*, the number of deaths indirectly from this cause is large. The extension of the disease to the seminal tract in the male, and to the genital organs of the female, and the ultimate migration of the infecting organism to the bladder and possibly the kidneys, to the synovial joints and the brain,—all may contribute indirectly, and in some cases directly, to death. It is stated by Valentine* that 80% of women who die from diseases of the reproductive organs are killed by gonorrhea.

*Read before Health Officers, Burlington, Vermont, July, 1906.

What is true of gonorrhea is also true of syphilis. This disease likewise kills indirectly by involving other structures. The lowered vitality, in consequence of a chronic disease such as syphilis, is responsible for a susceptibility toward other diseases which may result fatally.

Invalidism. The worst effects of gonorrhea and syphilis manifest themselves chiefly in producing lesions which result in invalidism. Blindness and involvement of joints are a frequent sequence of gonorrhea, and paralysis and insanity commonly follow syphilis.

Blindness. Gerrish states that of all the blindness in this country 15% is traceable directly to gonorrhea, and that from one-half to two-thirds of the cases of ophthalmia neonatorum are of gonorrheal origin. Valentine states that 80% of the blind in charitable institutions have lost their sight by gonorrheal infections during birth. The Committee of Seven found in a series of 1941 cases of women with gonorrhea occurring in private practice in New York City, that 265 of their children had purulent ophthalmia. During the same year they found 136 cases of purulent ophthalmia in one hospital.

Involvement of Joints. It is impossible to determine how frequently the joints are involved by the gonococcus as a consequence of gonorrheal urethritis. That it is common, and that it frequently results in permanent disability, no one who has to do with hospitals treating chronic diseases will deny. I have been unable to find any reliable statistics regarding the relative frequency of gonorrheal joint infection.

Sterility. In the Second Annual Report of the Committee on Prophylaxis of Venereal Diseases it is stated that in this country, gonorrhea is responsible for 66⅔% of sterile marriages, the condition of the male organs being responsible for one-third, and those of the female for two-thirds. It is believed that more than 40% of the barrenness in childless marriages is due to gonorrhea produced by a stenosis somewhere in the male seminal apparatus. Benzla, who investigated the number of offspring begotten by soldiers in the German Army who had had gonorrhea, found that 10.5% of those who had had the diesase without epididymitis were childless, while of those who had unilateral epididymitis, 23.4% were childless, and of those with bilateral epididymitis, 41.7% were childless. Leigeois found in twenty-eight patients who had had double epididymitis, that there was a complete absence of spermatazoa in twenty-one. Neisser states that 50% of all involuntary childless marriages are due to gonorrhea of the female genital organs. Kehren found in ninety-six sterile marriages that 45% were due to gonorrheal infections of the female generative organs and 30% to absence of spermatazoa in the husband. Chrolak places the

percentage of sterility due to the effects of gonorrhea in the female at 40%. Kammerer at 83% and Gruenwald at 53%. Lier and Asch found 221 women out of 227 sterile from the same cause.

Miscarriage and Depopulation. Abortion, the result of venereal disease, is common and exerts an important influence in connection with depopulation. Morrow, in this connection, states that 42% of abortions and miscarriages are to be ascribed to syphilis. He states that the statistics of European observers show from this cause a mortality of 60% to 61% in private practice and 84% to 86% in public hospitals.

Fournier mentions ninety women of the better class who, having been infected with syphilis by their husbands, became pregnant in the first year of married life. Of these fifty miscarried, 38 gave birth to children who died soon after, and two only had children who survived. He gives the following statistics to show how the germ of posterity may be extinguished in families contaminated with syphilis. In one family, out of 216 births, 183 deaths occurred. In another family, out of 157 births, there resulted 157 deaths, a mortality of 100%. These are probably extreme examples. Williams attributes 73% of all abortions to be due to inflammations of the cervix or uterus. Noeggerath found that 19 women out of 53 who became pregnant in the course of gonorrheal infection, aborted. Fiuhinsholz notes 101 pregnancies occurring in women affected with gonorrhea, out of which there were 23 abortions and 7 cases of premature labor. I have tried to obtain information relative to this from the maternity hospital in this community, but without result. Syphilis resulting in so high a percentage of miscarriages—about 60%—and gonorrhea resulting in sterile marriages—about 50%—and also in frequent abortion, are facts of importance to the welfare of this community.

Nerve Affections and Insanity. That syphilis is responsible for a large percentage of the cases of hemiplegia, general paralysis and tabes, and is generally recognized. Many authorities believe that general paralysis and tabes have no other etiological factor.

Mental Disturbances. That mental disturbances frequently have their cause in syphilitic infections is shown by the Annual Report of the State Board of Insanity for 1909. The percentages of patients in these various institutions are taken from the classification of "causes" as recorded in this report. It does not include the cases of general paralysis or other mental conditions of which syphilis may have been the origin.

At the Worcester State Hospital there was a daily average number of patients of 1233. Of this number 4.96 per cent., or 61, were syphilitics.

The daily cost per capita being $.65, the total daily cost to this institution for the care of these syphilitics was $39.65.

At the Taunton State Hospital there was a daily average number of 967 patients. Of this number 3.4 per cent., or 33, were syphilitics. The daily cost per capita being $.67, the total daily cost to this institution for the care of these syphilitics was $22.11.

At the Northampton State Hospital there was a daily average number of 848 patients, of whom .86 per cent., or 7, were syphilitics. The daily cost per capita being $.55, the total daily cost to this institution for their care was $3.85.

At the Danvers State Hospital there was a daily average number of 1438 patients. Of this number 3.75 per cent., or 54, were syphilitics. The daily cost per capita being $.55, the total daily cost to this institution for the care of these patients was $29.70.

At the Westboro State Hospital there was a daily average number of 957 patients, of which number 5.48 per cent., or 52, were syphilitics. The daily cost per capita being $.70, the total daily cost to this institution for the care of these syphilitics was $36.40.

At the Boston State Hospital there was a daily average number of 770 patients. Of this number 3.28 per cent., or 25, were syphilitics. The daily cost per capita being $.68, the total daily cost to this institution for the care of these syphilitics was $17.00.

At the Worcester State Asylum there was a daily average number of 1063 patients. Of this number 7.55 per cent., or 80, were syphilitics. The daily cost per capita being $.65, the total daily cost to this institution for the care of these syphilitics was $52.00.

At the Medfield State Asylum there was a daily average number of 1596 patients. Of this number 1.27 per cent., or 21, were syphilitics. The daily cost per capita being $.53, the total daily cost to this institution for the care of these syphilitics was $11.13.

At the McLean Hospital there was a daily average number of 220 patients. Of this number 11.71 per cent., or 26, were syphilitics. The daily cost per capita being $3.39, the total daily cost to this institution for the care of these syphilitics was $88.40.

The total cost to the state per day for maintaining the inmates who are in these institutions with syphilis is $300.24—a total cost to the state during the year of $109,587.60. These percentages of syphilitic patients do not represent the number of inmates who are at the institutions for the remote effects of syphilis. For example, Dr. H. W. Mitchell, Superintendent of the Danvers Asylum, in a personal communication to me, states that fully 10 per cent. of the patients in that institution are there as a result

of syphilis, yet the State Report shows but 3.75 per cent. If we included these cases, the cost to the state per day, instead of being about $300, would probably be more than double this amount.

Time prevents me from mentioning more than a few facts in connection with the economic importance of venereal disease. It is undoubtedly true that venereal diseases are constantly producing invalids who must be supported by the state. Children are being born of venereal parents, a certain percentage of whom are defective and must be cared for. The money for the maintainance of institutions for these unfortunate individuals is raised for the most part by taxation. In an attempt to cure, we are all contributing money which could be better invested in prevention.

At the Manhattan State Hospital in the year 1903, there were 4400 patients, 8.5 per cent. of whom were there on account of venereal diseases. The cost to the City of New York was $.46 cents per day per patient, which means that $60,209 was raised by taxation for them in that year. At present, at the Long Island Hospital, of Boston, 26 per cent. of the patients are there as a direct result of venereal infections. Many of these patients are chronic invalids, and have been cared for at the institution for years. The cost per patient per day is $.77, so that the City of Boston is each day expending $54.00 for the care of such patients in but one of its institutions.

As previously mentioned, this state is spending $300.24 a day for maintaining insane who are receiving institutional care as a direct cause of syphilis. It is impossible to figure the cost to the state and to the cities for the care of hospital, ambulatory, and house cases which apply to the numerous hospitals in the state for treatment because of venereal infections.

In syphilis and gonorrhea we have two of the most universal diseases—a proportion of about one syphilitic to one hundred with gonorrhea. These two diseases are exerting an important influence in the depopulation of the human race. A mortality of from 60% to 86% takes place among the offspring of syphilitics; sterile marriages result in about 50% of the cases where either parent has been infected with gonorrhea. Both of these diseases result in chronic invalidism which imposes a tax upon the community.

Something should be done. It is not my office to suggest at the present moment a remedy for the grave evils which exist in our community, as in others. It is my desire rather to call upon the body of men with whom the responsibility does lie to take active measures to correct these evils, and not to incur the just criticism of allowing them to go on evaded and unfaced.

DISCUSSION.

Dr. Bailey. One great danger in regard to gonorrhea lies in the fact that it is not commonly considered by the laity to be a very serious disease. The fact that it is not so considered probably reflects upon our own profession, for it was not uncommon some years ago for physicians to fail to regard gonorrhea as a serious ailment. The patient usually regards syphilis with sufficient horror, but gonorrhea is frequently considered to be no worse than a severe cold.

How many of the medical profession make it an invariable rule to allow no gonorrhea patient to go out of their offices without letting him know the possible results from this disease? In view of the frequency with which we see cases of gonorrhea, how natural it is to get tired of talking about it, and how easy to fail to take the time to explain to each individual who comes to us the possible complications entailed. Of course, we cannot always tell the patient all these possibilities at the first consultation,—it would frighten him altogether too much; but some time before we dismiss the case, it seems to me that it is our duty to enlighten that individual in regard to all of the possible major complications. If we haven't time to do this by talking to him, we can at least hand him some pamphlet which will cover the important phases of the subject. This Association of Boards of Health provides such a leaflet, as does the Chicago society. I always keep in my desk a supply of both of these and of certain others, some one of which I hand to the patient if I cannot take the time to talk to him. If I can take the time, I prefer to talk to him, because what we say carries more weight than any printed matter. Sometimes, of course, it is impossible to take the ten or fifteen minutes necessary to explain to him the possibility of such complications as gonorrheal rheumatism, epididymitis, endocarditis, the possibility of infection of his eyes, and the final possibility of the infection of his future wife and children. The last two items appeal most strongly to the patient. If we cannot possibly take the time to talk to the patient, we can at least give him a leaflet at that time during the treatment of the case which appeals to us as most opportune.

It seems to me unfortunate that most of the leaflets provided for the purpose contain a statement as to the frequency of this disease. I cannot see how it can do any possible good for a layman to know the appalling frequency of gonorrhea; on the other hand, it seems to me that it does harm. If a man knows that about seventy-five per cent. of all men are afflicted at some time or other with this disease, isn't he far more likely to excuse himself?

We ought to take every proper opportunity to show up the quack doctors to the patient. It is surprising how many patients afflicted with venereal disease go to the quack, but it is exceedingly difficult to expose and prosecute him. I have tried a good many times and failed. I recall a case not long ago of a young man who had been to a Boston quack three different times and paid him $50 each trip to treat him for syphilis, a disease which he never had, and to which he had never been exposed; at least he never had illicit intercourse. The quack told him, of course, that he had syphilis, and succeeded in obtaining $150 from him. This young man promised to come before the court to testify. I have a very good Boston lawyer, a friend of mine, who always stands ready to prosecute such cases; but at the last moment the young man came to me and said that he would not appear, although I promised him that the case would not become public in any way.

I want to emphasize the importance of teaching our children and of advising the parents in our clientele to have their children taught how to take proper care of the sexual organs, and certain facts which they ought to know about the dangers of venereal exposure. I, for one, positively do not believe that as much harm can come to a child from such teaching as from leaving him in ignorance. Cases like the following come to me with great frequency. I asked a young man who had contracted venereal disease: "Did your father or mother ever tell you anything about the danger of venereal infection or give you any word of instruction whatever in regard to this matter?" "Never a word," was his answer—a common answer among an intelligent class of young men.

My own children have been taught the origin of human life and the important facts in regard to sexual hygiene. They have been taught by their mother that these things are sacred; they are at perfect liberty to come to her or to me to ask any questions of this nature, but they are forbidden to talk about such matters with other children.

To summarize---I advocate strongly the teaching of the patient who comes to the office; the warning against the quack when we have the opportunity; the teaching of sexual matters to our own children and the educating of parents so that they may teach theirs.

Dr. Ayer. The questions for this Association to consider are: How are we going to get at this condition of things as a body? How are the cities going to look at it? What legislation is going to aid us? Can legislation help us in any way? Is the time not coming when we as physicians will be obliged to report venereal cases to the boards of health, just as we now report all other contagious diseases? I don't know whether or not

the time is ripe for such legislation, but it seems to me that idea should be constantly in the mind of every man practicing medicine; until something of that sort is brought about there will not be very much progress made in stamping out venereal diseases.

Dr. Chase. About two years ago we arranged a course of lectures on hygiene for our Brookline teachers. We had four meetings, and two addresses were given at each meeting. Dr. Palmer, of this Association, consented to speak on the subject of sex hygiene, and I have heard nothing but words of praise for the address he gave us on that occasion. During the present year an informal talk has been given by a male physician to the boys of our high school, and a talk to the girls was made by the woman physician who makes the physical examination of the girls. She used, for the most part, our leaflet on sex hygiene for young women and girls, and I have heard of no criticism whatever. A good beginning has thus been made in Brookline, and in the town of Spencer similar work is being done. We have not, however, given this plan any special publicity. Last year, at the meeting of the New England superintendents of schools, Dr. Palmer and Dr. Swarts of this Association gave most excellent addresses on the subject of sex hygiene.

Dr. Swarts. It is the duty of boards of health, who are supposed to be the conservators of public health, to attempt to stamp out any disease which is a preventable and communicable disease. We have before us two diseases which are in that category. We are attempting to stamp out diphtheria, scarlet fever, and other communicable diseases, but we absolutely avoid syphilis and gonorrhea, simply because we are afraid to take hold of the subject in the first place, and in the second place, we don't know how to attack it. I think the statistics which have been given here are a strong incentive, or should be a strong incentive, to those who are interested in their work as health officers to take hold of this subject in a practical manner. We find ourselves in the predicament of wanting to do something without knowing how to do it.

It has been stated here that the question arises as to how one is to introduce the subject. Without question it is a matter of education. It is doubtful whether it is advisable to give to the laity the alarming statements which have been made here---but one has to alarm the individual in regard to smallpox to keep him away from it. He has a fear of smallpox because we have told him what a horrible disease it is. We must necessarily utilize these statements to let the public know what the disease in question amounts to. We must teach the public how to avoid venereal disease, but with the natural animal instinct which is born in man we can-

not eliminate all the chances of infection. Protect the man, protect the woman as much as we may, the danger will still exist unless they are rightly educated on the subject.

Where shall the education commence? There are some who are prepared to tell their own children what they ought to know. I spoke once before the principal educators of the state of Rhode Island. Among those educators were men who stated that they were not prepared to instruct their children on sex hygiene. If the boards of health are to educate people in regard to the suppression of all communicable diseases, they should take some measures to teach the people how they can get at this question in order that they may teach others. But who is to teach? We may say it is the clergyman's duty. How often does he get the child into the Sunday School to give him even a religious sermon? Is it the duty of the physician to teach the family? How often is he capable of doing it? How often is he willing to do it, and when will he be allowed to do it, since the parents have not been educated to their duty? But the parents should be educated. While I was speaking before a mothers' club on sex hygiene, a mother said to me, "Whom can I get to speak to my children in regard to these matters? The subject is a pretty important one, but I don't know how." I replied, "Then your education was neglected in the public schools." We thus come back to the question of the education of the next generation, who in their turn as parents, will be able to educate their own children without depending upon outside aid.

Starting in the kindergarten with the question of biology, the subject is brought up in an unobtrusive way. It is naturally introduced into the second grade, and there we lose sight of the question of biology, sex reproduction, sex organs, or of anything to do with sex. We know we have stomachs for digestion, we know we have lungs for respiration, we possibly may know we have kidneys, but when we get as far as the bladder, we have lost sight of that organ, and as for the generative organs, there is no such thing. Why is it that in the public schools, where teachers are willing to talk about everything else, they are unwilling to consider normal anatomy? Simply because our puritanical prudery has blinded us to common sense. It is high time for those who are in authority---the boards of health---to take up the subject, and it is their duty to do so.

The state boards of health of Rhode Island, California, Indiana, and of some other states, have taken hold of this subject from the medical sanitary standpoint and are endeavoring to educate the people, but the sociologists in this, as in everything else in sanitation and hygiene, are making

us understudies. That is a shameful condition of affairs. We are in position to teach the people in regard to sanitation, hygiene, housing, and child welfare; but what are we doing? We have sent out a few pamphlets, and that is about all. This Association has done fine work in sending out 100,000 of these pamphlets, but the need of such education exists, as is shown to me by the daily receipt of requests for the pamphlets in question, requests which have come from places as far off as the Hawaiian Islands, South Africa, Australia, and England. The State Board of Health of Rhode Island is also sending out special leaflets, or special brochures, which will apply to different individuals; for in educating the laity on this subject, we must consider the different sexes, the social relations, and the different ages. We cannot introduce this subject first in the upper grades of the public schools; to do this would be a mistake. But if this education came as a natural sequence in the course of education in hygiene and sanitation, there would be nothing more to sex reproduction than to the ordinary question of milk and of water supplies.

If some action can be taken by this Association looking towards the question of educating the public through mothers' clubs, church clubs, and similar organizations, and of influencing those whose influence is strong with the legislatures, local and state; and if laws can be enacted which will assist boards of health in demanding such lectures in the school, we shall be doing good work. It is a question, however, as to who is to educate the people. To obtain good lecturers on the subject is a hard matter; there are very few men, even physicians, who can attempt it in the right way. During the last few weeks, in the city of Providence, there has been an effort in a new direction. Professor Seerley, representative of the Young Men's Christian Association Training School of Springfield, has been spending a whole week in lecturing to the fathers and mothers and to clergymen at the association rooms, and in going out into the factories at the noon hour, and in going out among the operatives in the different mills and disseminating knowledge on the subject in question. At the noon hour women physicians are giving a twenty minute talk to the girls in mills, in rubber factories, and in other places---an education which is appreciated by those people in a way that you cannot understand unless you could see them. What has been done in one place can be repeated in others. The state of California has an exhibit and a group of lecturers on the subject. In a very short time I hope to see every state take an interest in this matter, and I hope each state board of health can have a corps of educators on sex hygiene.

Dr. Palmer. I am of the opinion that not one-tenth of the cases of venereal disease go to any regular physician or hospital for treatment. The keynote of medical education today, and of medical practice as well, is prevention. It is all right for us to talk to our patients, as a father to a son, when they come to us, but in my opinion it is still more important, to talk to them before they become patients, before they contract the disease. In other words, we should seek to prevent this horrible state of affairs by education. It is a fact that there are more willing to listen and to be taught on sexual matters than there are those who are capable and willing to speak and to teach. One of the leading girls' seminaries in this commonwealth has written to me again this year to come and talk to the girls on this sex question, a fact which shows their willingness to be taught.

We have in this Association a Committee on Sex Hygiene which has been at work for a few years, and which has done considerable good. The inquiry for our leaflets has been very great, far greater than we have been able to supply. Various organizations are seeking information of this character. The hearing that this committee got before the New England Association of School Superintendents was one of the most helpful ones that we have had. After that meeting there was a general discussion, and a committee was appointed to investigate the feasibility and advisability of having sex hygiene incorporated into school books on physiology. If that is favorably acted upon it will be a long step forward in educating the people in such subjects. Our committee has had an ideal program, only a portion of which we have been able to carry out. One example of this has been referred to by one of the previous speakers, namely, requiring the reporting of venereal cases to health authorities. This should be done, but it is a hard problem. I am not a faddist, nor a Utopian dreamer, and I recognize the difficulties, but I think there is some way by which we can get an entering wedge by which these horrible and dangerous cases can be reported.

At the New England Association meeting a woman present raised a question as to how far a knowledge of wrong was a guide to right doing. That is an open question, but to my mind there is no doubt about what is wise and proper for boards of health and for teachers to do, and that is to teach this most fundamental and important subject in such a way that it will be put where it belongs—among the noblest things to know. We distributed circulars at that convention and asked the school superintendents to take the subject up in their immediate fields. To show that the road is not all easy, and that not all people are ready to accept our teaching, the contents of the following letter, which

has recently been received by our committee, is significant: "Dear Sirs: What do you think of calling the language in circulars Nos. 1 and 3, obscene, indecent, and not fit to be sent through the mails? I have recently sent out about 400 to parents, leaving it to their judgment whether or not they will allow their boys and girls to read them. The result is that my committee is so enraged and shocked that my professional head is to come off. I regret the result, but not the effort made to put into the hands of parents information that is so much needed. I have thought that you ought to know what some people think of your efforts to help the needy."

I am reminded by the action of that particular school board of what I recently heard some people say of a so-called learned judge—that he had the greatest and most profound ignorance on general subjects, and that he knew the least on the most questions of any man they ever knew. When that school committee can see in this leaflet of ours anything obscene or too indecent to be sent through the mails, it shows more vividly than anything else we can say or do the monumental need of just this kind of instruction. Instead of discouraging me in discussing these questions and distributing these leaflets, it is the biggest spur imaginable to disseminate just this kind of knowledge; and when we take the sex question and separate it from the sensual idea we have won the day. That is the ground on which it is to be put, and it is the ground on which every pure-minded person is ready to listen.

I hope that we can go forward from this meeting, with renewed courage, and can take up this question in a broad way and thus get some legal status so as to employ the assistance of the law in protecting the public from their own follies. We do it in other things;—why not in sex hygiene?

Dr. Durgin. Every board of health in this state has the authority to take any patient having either gonorrhea or syphilis to the hospital, by force if necessary, and to hold the patient in the hospital in the same manner and under the same regulations as one would a patient with diphtheria. Those who are financially able can be made to pay for the hospital treatment, while the city or state can be held responsible for those who cannot pay.

OPHTHALMIA NEONATORUM: PROGRESS IN PREVENTION.

By HENRY COPLEY GREENE,
Field Agent for Conservation of Eyesight, Massachusetts Commission for the Blind.

The Massachusetts Commission for the Blind has evidence that the simple subject of ophthalmia neonatorum is still widely misunderstood. The disease and its prevention have been discussed almost *ad nauseum* in both the medical and the lay press, yet many an ignorant mother still thinks that the result of gonorrheal infection is just "sore eyes" and curable with breast milk; even a physician recently said he "could not see how the baby happened to catch cold." Another doctor, who had used no preventive at birth, called his patient's blindness "just an accident, like falling down stairs." Another—and he is but one of a large class—professed not to know that the disease was reportable. The clerk of the board of health in one of our important manufacturing cities asked me last year whether ophthalmia neonatorum wasn't the same thing as *exophthalmic goitre.*

The subject is important,—and important not only to children made blind for life, but to the state. It means an additional expense of some $3,000 for each child's special education; and it means suffering in all parts of the commonwealth. For this disease attacks no one city or section. It has sent into the Nursery for Blind Babies, children from Boston, Salem, Lawrence, Stow, Clinton, Springfield, Brockton, Fall River, and many other cities and towns.

This disease is preventable. Since the eighties, when Credé proved the efficacy of the method known by his name, ophthalmia neonatorum has been an anachronism. In the presence of recognized danger, Credé's method has become orthodox. Modified to insure safety, it has recently been made obligatory at every birth occurring at any lying-in hospital in Massachusetts. The Secretary of our State Board of Health has officially recommended its routine use by private physicians. The State Board of Health, moreover, has sent to every registered physician in the commonwealth a dropper containing a one per cent. solution of nitrate of silver, with directions for its use. The use of this dropper should be encouraged. In certain instances, I believe it should be extended outside the medical profession.

A study of official records shows that from 5% to 27% of the births registered in 5 Massachusetts cities in 1909 were attended by midwives.

Though these women may be fined and imprisoned for delivering any child, their activity is notorious. This being the case, the agent of one of our most efficient boards of health has called the more skillful midwives of his city into his office, has given them a demonstration in the use of the state board's dropper, and has provided each of them with an outfit.

Let me express my belief that in Massachusetts we have the opportunity, and so the duty, of gradually eliminating these women from medical practice. As Secretary of the Boston–1915 Committee on Midwives, I have accordingly called the attention of the Chairman and the Secretary of the State Board of Registration in Medicine to the fact that Maddellina della Russo, an old offender, has been fined for failure to report a case of ophthalmia neonatorum to the Boston Board of Health. The evidence at the trial appeared to prove that this woman was practicing medicine without a license. My committee is of the opinion that she should be further prosecuted. I am also inclined to ask that legal action be taken against a prominent, but very ignorant, midwife in another city. She delivered a child who is now at a city hospital, blind from ophthalmia neonatorum. It seems not unreasonable to ask that the local authorities should take measures to make her an example.

I mention these instances to illustrate the complementary lines of work in which members of this Association may be interested to join: first, the informal recognition and instruction of the less dangerous midwives; second, prosecution of those whose ignorance makes their practice a menace to eyesight and even to life.

The neglect of many physicians in this commonwealth is, unfortunately, a far more serious danger to the eyesight of children than is the more ignorant but more restricted practice of midwives. Among 5949 babies whose births were reported in 1909 by 95 physicians in 5 Massachusetts cities, 42%, or almost half, were delivered by physicians who never use a recognized preventive. We have no later records covering a great number of births. We have facts showing not only frequent neglect of preventive measures, but carelessness in their employment.

The records of the Secretary of the State Board of Health show that in the last three months the state inspectors of health have investigated 77 cases of ophthalmia neonatorum reported to 29 local boards of health. Of 72 physicians in attendance, only 28, or 39%, had used a preventive at birth. Still more notable than this neglect is the occurrence of ophthalmia neonatorum in 45 cases where the preventive was said to have been used. Some few of these cases may have been simply silver conjunctivitis, due to a too zealous use of the dropper; but many of them

are doubtless cases of so-called secondary infection. If the baby's eyelids are not *aseptically* cleaned at birth, or if the baby is washed in infected water, or wiped with septic towels, then ophthalmia neonatorum may, and often does, supervene, in spite of *antiseptic* care at birth. And as primary cases may result disastrously, so too these secondary cases may and sometimes do result in life-long blindness.

Can the blindness resulting from ophthalmia neonatorum, whether primary or secondary, be prevented? In ninety-nine cases out of a hundred it can be prevented, but only by prompt and adequate treatment. If such treatment is not provided, the responsibility, in the last analysis, must almost always rest with some board of health.

This statement, I am fully aware, may seem radical, for if a case of ophthalmia neonatorum is not reported to a board of health, how can the board be responsible for its treatment? I must answer by asking: If the case is not reported, why is it not reported? The law requires, not only for gonorrheal conjunctivitis in infants, but for every case where the eyes are "red and swollen and show an unnatural discharge," that the presence of these symptoms be reported. This is the law; and the records of the Boston Board of Health show that the law CAN BE ENFORCED.

Last August, 9 Boston cases were reported; in September, 10. A conviction for failure to report a case was then secured by the Boston Board of Health. In October, the number of reported cases rose to 20; in November, it fell to 10. Further prosecutions were successfully carried through, and in December of last year, and January and February of this year, the numbers of reported cases rose to 15, 32, and 97. This increase seems, moreover, to have nearly reached a stable maximum; for in March, without further convictions, the number of Boston cases stood at 116. It will hardly be maintained that this increase of reported cases, from 10 last December to 116 this March, is due to an epidemic of the disease.

If so general an observance of the law can be brought about in one city by half a dozen prosecutions, how can boards of health in other towns and cities escape the responsibility when the facts are not reported to them? I ask this question in all seriousness, and with regret. No one can regret more than I regret the lamentable spectacle of mistaken men and women fined in a police court. But I am more shocked by the spectacle of pus oozing from the eyes of children made blind because these careless men and women have failed to give your boards the opportunity to take immediate measures in order that blindness may be prevented.

In mentioning the Boston Board of Health's success in securing a general observance of the law, I am far from wishing to imply that noth-

ing has been done outside of Boston. On the contrary, the average monthly report of cases outside of Boston has more than doubled during the last year. This increase is gratifying. The monthly averages, however, were only 8 for 1909, and 18 for 1910; and the state totals, excluding Boston, were 19 in January and 21 in February of this year. In view of these figures, it is evident that the maximum is still to be attained.

There are difficulties in the path. I have talked on this subject again and again with nurses and with physicians, good, bad, and indifferent; and I think I realize how serious the difficulties are. Nurses fear that obeying the law will get them into trouble with the physicians on whom their livelihood depends. Some physicians dislike giving boards of health an opportunity to interfere in their private practice. Others at times feel conscientious scruples against stamping a family, as they say, with the stigma of gonorrhea. But if these physicians will obey the law by reporting every case of "babies' sore eyes," whether gonorrheal or not, their action will besmirch no individual family. As for loss of fees through boards of health sending babies to a hospital, or otherwise providing for their care,—the physician who prefers his pocket to a child's chance for eyesight must be ignored. As for the nurses—their position is delicate; but if the fact is made clear that they MUST report, then they will escape professional blame, and their action—as in a recent case near Boston—may save a baby from probable blindness.

Now suppose all cases, or almost all cases, reported according to law. Then, by adequate treatment, perfect eyesight can practically always be preserved. In what does such treatment consist? Not in the treatment given, however well meaningly, by the average obstetric practitioner; for the great majority of children blind or partially blind from ophthalmia neonatorum have received no other care. Not in home treatment, without an expert nurse; for the results, as we have seen them, are too often bad. Not in hospital treatment, after a week's or three days' or sometimes even two days' delay; for when our best hospitals fail, it is with cases sent in late. Adequate treatment for anything but light purulent cases means, first of all, not merely prompt, but immediate treatment; for the medical member of a neighboring board of health who delayed overnight when called to a case last summer, gave this commonwealth a blind child to educate. Adequate treatment means immediate treatment, and it means either treatment by a skilled physician familiar with the disease, and aided by at least one intelligent, trained nurse, or swift transfer to an appropriate hospital.

Failure to secure such adequate treatment does not, of course, spell blindness in every case—far from it. Many a physician and many a

board of health grows skeptical of danger; but the danger is none the less real. Like lightning, this disease strikes where least expected. Blindness follows, not always, but far too often; and, in our experience, this blindness follows on some failure to enforce treatment that may be called adequate.

In these circumstances, I cannot but say that a very serious responsibility rests on our boards of health. The state district health inspectors, to be sure, are doing gallant work. Directed by the Secretary of the State Board of Health, they are investigating all cases of ophthalmia neonatorum reported by local boards as soon as the electric wire can put them on the job; and in consultation with local boards, they are securing for neglected cases the best care that seems possible. In the nature of things, however, the state inspectors must often arrive too late to fill gaps. In local health work these gaps should not exist. The local boards have the opportunity to investigate long before the state inspector can reach the scene; and the local boards are directed by law to take that immediate action which is necessary in order that blindness may be prevented.

In closing, I wish to call attention to a contrast between the standards of two local boards of health. At the first, which by the way, is in a considerable city, I recently found the Board of Health's books for this year with no record of any case of ophthalmia neonatorum; and no case, as far as I can learn, had been reported to the State Board of Health. Two of the inspectors, however, found for me in pigeon-holes of their desks, two cases reported by local doctors. These cases had not been investigated, and no action had been taken to prevent blindness. The inspectors, as they said, were laymen, and hesitated to interfere in any physician's practice. In the second city, all reported cases of ophthalmia neonatorum are recorded on the books of the Board. Through moderate, but unswerving court action, the number of these cases has been increased more than tenfold in seven months. Every case is investigated at once by a city nurse, and a report is immediately sent in. If this report leaves any doubt as to the safety of the child's eyesight, the case is further investigated, and, if necessary, the board's police superintend the removal of the child to a hospital where safe care can be provided. Need I add that we have yet to hear of a case of blindness resulting in this second city since this system was put in force?

I have called attention to this contrast between two cities, with no allusion as to the possibility of extending an elaborate follow-up system into every small city and town. Courageous and immediate action, however, may be taken in the smallest village. I trust and believe that the members of this Association will do their duty in this regard.

DISCUSSION.

Dr. Durgin. It is to be regretted that the courts must be resorted to in order to secure reports of cases of ophthalmia neonatorum. We began by sending a copy of the law and an admonition to every physician and nurse in the city of Boston. This we did twice. During the last year we have prosecuted more physicians for not reporting this one disease than we have prosecuted in thirty-eight years in connection with any other single disease, and with results which are not complimentary to the medical profession. It appears to me that there is a want of zeal among the boards of health of Massachusetts in demanding and following up reports on these cases. The law is clear, and the matter is an important one. Boards of health should move vigorously, and, if necessary, appeal to the courts.

Dr. Swarts. It is difficult to say who is responsible for the failure to report cases of ophthalmia neonatorum,—whether it is due to the indifference of the physician, to his ignorance or carelessness in regard to instructing his patients, or to the general ignorance of the public with reference to this disease. Many of the cases where the physician is blamed are found to be secondary infection, coming from the parent, from the father, or at least coming in such a way that it cannot be blamed upon the physician. The question of midwives is a most annoying one. Midwives have no right to practice in the state of Rhode Island, but although often prosecuted, they practice in about one-third of the cases of childbirth. It is an interesting point that the amount of ophthalmia neonatorum in their practice is much less than in that of the physicians, a fact which is no credit to the fraternity.

In Rhode Island, we are endeavoring to educate the fraternity, in so far as they are willing to learn, by issuing some little pamphlets on ophthalmia neonatorum. We issue these to the physicians at the same time that we send around each year the ophthalmia neonatorum outfit. Rhode Island was the first to introduce ophthalmia outfits, and to place these outfits at the stations where diphtheria tubes are kept. I had the honor to introduce a form of dropping outfit, which consists of the little phial with a one per cent. nitrate of silver solution, and a plain dropper with a blunt end.

The outfit used by the State Board of Health of Massachusetts contains a larger quantity of nitrate of silver, and it can be used for more than one case by placing the cap over the end of the container. Some physicians are very expert in the use of the outfits, but many are not. The

Massachusetts outfit has the advantage of having plenty of fluid, but the question of the concentration of the fluid, if it remains in the container for some time, is a serious one, as the solution may become a little too strong for the eyes. A container has been introduced which is made of celluloid, with a celluloid cap. To liberate the fluid a pin or needle can be used to pick the cap. It has been found, however, that the solution becomes concentrated by evaporation, and finally disappears within a period of three or four months. A paraffine outfit has also lately been introduced which has not yet been subjected to test. The one objection to paraffine is its liability to break when cold.

As chairman of a committee, I have endeavored to see if we could find a prophylactic which would not degenerate with age, time, or light, and I think I have succeeded in finding something which may be of service. It is called sophol, and is a combination of nitrate of silver with some albuminate and formaldehyde. It can be dispensed not only in powder but in tablet form. That may have its advantages and its disadvantages. In the meantime I think we had better hold to the simple one per cent. nitrate of silver solution as given out by boards of health, who will take care that the proper solutions are provided. The objection to using argyrol is that its color leads the laity to believe that injury is done to the eye.

Notes and Reviews*

PUBLIC HEALTH NEWS AND NOTES.

By B. L. ARMS, M. D., Boston.
(*Reviewer.*)

National Association for Preventing the Pollution of Rivers and Waterways. An interesting association has been formed under the title of National Association for Preventing the Pollution of Rivers and Waterways. The organization has adopted as its motto, "The Nation's Greatest Asset is Pure Water."

In February, 1910, Dr. Wm. H. Welch, Dr. Ira Remsen, Calvin W. Hendrick, Esq., Brigadier-General George H. Torney, U. S. A., Samuel M. Gray, Esq., H. deB. Parsons, Esq., Bernard N. Baker, Esq., Rudolph Hering, Esq., Lieutenant Colonel Jefferson R. Kean, U. S. A., and Major Frederick F. Russell, U. S. A., called on President Taft in relation to the broad question of public health, and the nation's asset in having unpolluted water. The result of this interview was the formation of this Association, which has as its aim the study of the question of the pollution of the rivers and waterways of the United States. There has been some clashing between cities and between states on account of the lack of uniformity of law and practice regarding the disposal of sewage and trade wastes. Many methods of disposal have been installed regardless of results. Procrastination in properly handling sewage and trade wastes, and the crude method of disposal by emptying into rivers and waterways, has created serious conditions in certain parts of the country.

The Association, which began in an interview with the President, has grown within a year to have members in almost every state and territory in the Union. Although its membership is small, its character and standing is such as to give this movement more than passing weight. Mr. Calvin W. Hendrick of Baltimore, Maryland, is Chairman of the Association, and Mr. H. deB. Parsons of New York, is Secretary.

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

The members feel that now, before the nation's problems have become too serious, is the proper time to take up this matter of pollution, and to educate the people by bringing before them a knowledge of the dangers which may accrue from promiscuous pollution, and of the loss which may occur by not properly foreseeing the future and taking the necessary advance steps on the theory that "an ounce of prevention is worth a pound of cure."

It is the Association's idea to study the problem from a national viewpoint, to digest existing laws on the subject, and to prepare a report on their views and recommendations on questions arising from the diversion and pollution of interstate waters and from sewage disposal. It is felt that such a report would be of national assistance in shaping future action, especially when put forward by such professional men as comprise this Association.

Investigation of the Milk Commission of the Cincinnati Academy of Medicine. At the time of the last annual report* of the Milk Commission of the Academy of Medicine, Cincinnati, Ohio, April 17, 1911, the Commission presented the following resolution:

"WHEREAS, Certain members of this Academy have, by innuendo and otherwise, cast reflection upon the integrity of the members of the Commission in special reference to the financial administration of their work; and

"WHEREAS, It has been suggested to the dairymen under the Commission's supervision that they have been charged exorbitantly for such supervision; and

"WHEREAS, Such action directly impugns the honor of the members of the Commission,

"Now, therefore, we, the members of this Commission, do demand that these insinuations and the entire administration of the Commission, from its inception to the present time, be searchingly investigated by the Board of Censors of the Academy, who shall have power to employ an expert public accountant to assist them in their work.

"Furthermore, we ask that this report by the Board of Censors be submitted in writing, and made the special order of business of the Academy of Medicine for nine o'clock on Monday evening, May 1, 1911."

On motion of Dr. Gillespie, this resolution to refer was unanimously carried.

It was then moved by Dr. Joseph Ransohoff that, pending the investigation asked for, a vote of confidence be tendered the Commission. Dr.

*Fifth Annual Report Milk Commission of the Academy of Medicine, Cincinnati, Ohio, April 17, 1911.

C. A. L. Reed moved, as a substitute, that the Academy re-elect the Commission in recognition of its faithful and beneficent labors. This motion was carried by a rising vote.

On account of the limited time, the Censors employed an expert accountant,* who went over all books, bills, and other records, which were found to be correct in every detail. The dairymen were questioned; in fact, a most searching examination was made. They found that the Commission had not only accounted for all money received, but "that on occasions the Commission have gone into their own pockets to defray expenses which might legitimately have been drawn from the funds of the Commission."

In conclusion, the Censors moved that a vote of censure be passed on three members of the profession, on the ground that they had been guilty of unprofessional conduct, because they had been instrumental in starting the investigation against the Milk Commission. This motion was carried.

†**Smallpox in the United States—Prevalence and Geographic Distribution during the Calendar Year, 1909.** (From information furnished by state and local health authorities and registrars). During the calendar year 1909, smallpox continued to be prevalent in the United States. There were, however, fewer cases reported than during the preceding year, but the number was nevertheless excessive when compared with that reported in other countries, and regrettable, when the preventability of the disease is considered. The mildness of the disease continued a striking feature and one not as yet satisfactorily explained, the average case mortality rate being less than one per cent.

Although smallpox is more generally required to be reported than any other disease, and our knowledge of its prevalence and geographic distribution is undoubtedly more accurate and complete than it is for any other disease, with the possible exception of leprosy, there are no existing means by which we can accurately know how prevalent smallpox has been, or now is, throughout the country as a whole. This information can be obtained only for the states in which the cases of the disease are regularly reported to the authorities.

Reports have been received as to the prevalence of smallpox during 1909 in the following states: Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New York, North

*Cincinnati Engineer, May 2, 1911.
†Public Health Reports, June 2, 1911.

Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Utah, Vermont, Washington and Wisconsin, and in the District of Columbia. These states with a total estimated population of 58,839,200, reported 19,534 cases, with 92 deaths, which is 34 cases for each 100,000 inhabitants and 0.471 deaths in each 100 cases.

Partial reports have been received from certain other states.

Recent Meetings. During the past month there has been a series of meetings on the milk question which will have a decided influence on clean milk. On Monday, May 22, at the Academy of Medicine in New York, a conference was held on invitation of the New York Milk Committee, at which the following were present: Drs. Evans of Chicago, Rosenau of Boston, Park and North of New York, Anderson and Melvin of Washington, Levy of Richmond, Van Slyck of Geneva, Stewart of Philadelphia, Stokes of Baltimore, Ravenal of Madison, Goler of Rochester, Pearson of Albany, Arms of Boston, Professors Conn of Wesleyan, Stocking of Cornell, Sherman of Columbia, and Mr. Wells, Health Officer, of Montclair. A more detailed account of this meeting will be given next month.

In Philadelphia, from May 20th to May 27th, the Philadelphia Milk Show was held' 'To enlighten, not to frighten." There was an exhibit, and daily addresses were given to many hearers.

Beside these meetings there were also held at the Bellevue-Stratford, in Philadelphia, the Fourth Annual Convention of the Certified Milk Producers' Association of America, May 22 and May 23; the Fifth Annual Meeting of the American Association of Medical Milk Commissions, May 23 and May 24; a Health Officers' Day to discuss the Report of the Milk Commission of Philadelphia, May 25; and a Dairy Institute at the New Veterinary Building of the University of Pennsylvania, May 24 to May 26.

Sanitary Engineering at Harvard University. The recent appointment of George Chandler Whipple, the well-known sanitary engineer, to a new professorship of sanitary engineering at Harvard, is an interesting sign of the times. Mr. Whipple is favorably known to all public health workers as the author of the "Microscopy of Drinking Water," and of an excellent volume on "Typhoid Fever," as well as in the capacity of one of our most accomplished and experienced practical sanitary engineers. Our oldest university is to be congratulated on having secured Dr. Rosenau as its representative in Preventive Medicine and Hygiene, and it now further strengthens its staff by the appointment of Mr. Whipple, who has shown

his ability to write and to teach, as well as to investigate and practice. For some years he has been publishing extensively and giving instructions in sanitary engineering at the Brooklyn Polytechnic Institute.

W. T. S.

Massachusetts Supreme Court Declares Milk Bottle Regulation Invalid.

In October, 1910, the Board of Health, of Boston, Massachusetts, amended a milk regulation so as to require all milk to be sold from bottles. The Supreme Court of Massachusetts has recently handed down the following decision:

COMMONWEALTH VS. WILLIAM W. DREW.

Knowlton, C. J. This is a complaint against the defendant for the violation of a regulation of the board of health of the city of Boston, relative to the sale of milk. The material part of the regulation is as follows: "No person or corporation shall sell or offer, expose or keep for sale in any shop, store, or other place where goods and merchandise are sold, milk or cream, unless the same is sold or offered, exposed or kept for sale in tightly closed or capped bottles or receptacles which have been approved by the board of health." It was agreed that milk was kept for sale by the defendant in a vessel contained in a covered cooler in his store; that it was always kept at a temperature less than fifty degrees Fahrenheit, and that none of it was allowed to stand outside of the cooler except while a sale of milk was being made; that the cooler was always kept properly drained and cared for and tightly closed, except during such interval as was necessary for the introduction or removal of milk or ice, and was kept in such location and under such conditions as were approved by the board of health. The milk was wholesome milk of standard quality, was taken from a clean, new tin cylinder or vessel, set in a clean new ice chest, surrounded by clean, wholesome ice. The vessel had a removable cover which was new and clean, and the measure which was used by the defendant in retailing the milk was new and clean, and hung inside the tin cylinder so that it was not exposed to the air. The cylinder was simple in shape, was easily cleaned, and was susceptible of perfect sterilization. The sales were made in any quantities desired by the customers from one cent's worth upward. The defendant's store was in a district in which many poor people live, and facts were agreed to tending to show that such people often want to purchase a quantity less than the quantity contained in the smallest bottles used, and would be put to inconvenience by the enforcement of the regulation.

We do not consider the question whether this regulation goes beyond the constitutional power of the legislature to enact as a statute, or to

authorize the board of health to establish locally. For we are of opinion that the statute under which the board assumed to act is not broad enough to give them this authority. It is as follows: "The Board of Health shall examine into all nuisances, sources of filth and causes of sickness within its town, or on board of vessels within the harbor of such town, which may in its opinion be injurious to the public health; shall destroy, remove or prevent the same, as the case may require, and shall make regulations for the public health and safety relative thereto, and relative to articles which are capable of containing or conveying infection or contagion, or of creating sickness, which are brought into or conveyed from its town, or into or from any vessel." By section one hundred and forty of this chapter the section is made applicable to cities.

This statute does not give the board power to make regulations as to all matters affecting the public health. If the board should be certain that the smoking of cigarettes by boys affects their health injuriously, it would have no power to make a regulation forbidding the smoking of them by boys under a certain age, or the sale of them to such boys. It has no power to make general regulations as to conduct or practices injurious to health, which if indulged in by many persons, affect the health of the public. The statute above quoted gives the board jurisdiction to deal with "nuisances, sources of filth and causes of sickness within its town." Plainly the milk in question was not a nuisance or a source of filth. In determining the meaning of the word "causes of sickness" the doctrine of *noscitur a sociis* is to be applied. It is a little broader term than the two terms that precede it, but it is of the same general character. Primarily it refers to something local, and the board is directed "to destroy, remove, or prevent the same." In section sixty-three we have another indication of the meaning of these words in the requirement that the board shall order the owner or occupant of private premises to remove any "nuisance, source of filth or cause of sickness found therein." So under section 74 he may obtain a warrant directed to an officer or to a member of the board, commanding him to destroy, remove, or prevent any "nuisance, source of filth or cause of sickness," in reference to which they have made complaint to a magistrate. We are of opinion that, within the meaning of the language in these sections, milk kept in a vessel, as this was kept by the defendant, was not a "nuisance, source of filth, or cause of sickness," which gave the board of health jurisdiction to take any action or make any regulation under the R. L. c. 75, s. 65.

The latter portion of this section gives the board jurisdiction to make "regulations relative to articles which are capable of containing or conveying infection or contagion, or of creating sickness, which are brought

into or conveyed from its town, or into or from any vessel." This has reference to the bringing into the town or conveying away of articles capable of containing or conveying infection, in such a way as to affect injuriously the public health or safety. The legislation is found in the Rev. Sts. c. 21, s. 6, in which the language is "when such articles shall be brought into or conveyed from their town, or into or from any vessel." In the Gen. Sts., c. 26, s. 5, the words "when such articles shall be" are omitted, and the section reads in this part "brought into or conveyed from its town, or into or from any vessel." In Pub. Sts., c. 80, s. 18, the language is the same. We are of opinion that this part of the section relates to articles of such a kind as to be dangerous in reference to their capability of containing or conveying infection or contagion, or of creating sickness, in connection with their removal from one town to another. The case of Train v. Boston Disinfection Company, 144 Mass., 523, relative to the disinfection of rags, furnishes an illustration of what is meant by the statute.

The regulation in the present case has no reference to property in connection with its removal from one city or town to another. Nor is pure milk such an article as is referred to in the statute. We are of opinion that this part of the section does not authorize a regulation as to the sale of milk kept and sold in the manner that is disclosed in this case.

We have no occasion to consider the objection to the regulation in this part which subjects the business to an absolute determination of the board as to whether they will approve of the bottles or receptacles used in making sales. See Com. v. Maletsky, 203 Mass. 241.

Verdict set aside.

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

Bacterial Growths in Water Mains Following the Application of Hypochlorite of Lime. Many inquiries have recently been sent out from waterworks asking for information concerning the development of bacterial growths in water-mains after the supply has been treated with bleaching powder.

Mr. J. W. Ellms, Superintendent of the Cincinnati Water Filtration Plant, published an article upon this subject in the Engineering Record of April 29. Describing the bacterial growths which developed in the filtrate after the application of bleach to destroy algae in the water passing to the filters, he writes: "Within four days after beginning this treatment of the applied water a large increase in the number of bacteria in the filtered water was found."

A similar condition developed at Columbus, as will be noted from the following figures:

WHOLE NUMBERS OF BACTERIA FOUND PER CUBIC CENTIMETER IN

River Water	Settled Water Applied to Filters	Effluent from Filters	Water from City Mains	
			In the Center of the City	In the Outskirts of the City
6,000	18	25	500	1,800

A series of tests were made upon cultures of the bacteria found in the greatest numbers in the samples of water taken from the Columbus water mains, in order to determine whether or not they were pathogenic. The bacteria were inoculated into guinea-pigs, and into lactose agar, lactose bile, gelatin, milk, indol solution, and other media, duplicate sets of tests being placed at 39° C. and 20° C. The guinea-pigs have not shown any effect from the inoculation, although the treatment was applied more than a month ago. The cultures placed at 39° C. did not show any growth, although cultures of *B. coli* set in the incubator at the same time grew vigorously and produced normal reactions in all of the media.

The cultures of water bacteria placed at 20° C. formed strong growths in all media, but did not form any gas in the fermentation solutions, and the organisms did not develop in the closed arms of the Smith tubes. I

infer from the tests upon guinea-pigs and culture media that the bacteria which appeared in such great numbers in the water-mains belonged to species which are non-pathogenic. This statement is borne out by the fact that, even though the whole numbers of bacteria were large, tests made upon the city water by using 50 cubic centimeters for incubation did not give any reactions for *B. coli.*

In view of the fact that hypochlorite tends to produce tastes and odors in water, it is interesting to note that when bleach is applied to filtered water in quantities ranging from 0.25 to 0.50 p. p. m. of available chlorine, consumers do not complain of the taste or odor, but when the bleach is applied in quantities amounting to 0.7 p. p. m. of available chlorine (made from lime bleaching powder), consumers complain of a "medicinal" taste in the water.

The gist of the matter seems to be, then, that bleaching powder destroys *B. coli* and other pathogenic bacteria, but that "after" growths of SAPROPHYTIC bacteria may develop, especially in waters which have been purified by lime.

DATA FROM WATER PURIFICATION WORKS—March, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins.						Parts per 1,000,000						Nos. of Bacteria per Cu. Centimeter		No. of Deaths from		
						Settling Basin			Coagulation Basin			Unpurified Water			Purified Water							
						Period in Hours	Effluent		Period in Hours	Effluent												
							Turbidity	Bacteria per c. c.		Turbidity	Bacteria per c. c.	Turbidity	Color	Total Hardness	Turbidity	Color	Total Hardness	Unpurified Water	Purified Water	All Causes	Typhoid Fever	Pulmonary Consumption
Albany, N. Y.	100,700	Hudson River.	16 rapid sand, 8 slow sand Filters and Disinfection.	21.8	5.9	18.	15	63,000	Combined with the sedimentation.			56	30	71	0	18	71	72,000	40	205	0	26
Cincinnati, O.	364,463	Ohio River	Rapid sand filters using lime and iron as a coagulant.	43.6	2.41	48.	62	3,300	10	13	550	140	...	63	0	...	71	9,600	5	572	3	75
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	13.5	0.3	18.	1	7	Combined with the sedimentation.			28	22	263	0	6	84	1,500	5	198	1	24
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	8.0	1.7	6.	...	....	1.5	....	53	39	7	37	0	0	39	23,800	4	115	2	11
McKeesport, Pa.	42,694	Yoghiogheny R.	Water softening and mechanical filtration.	3.3	0 2	20.	0	60	Combined with the sedimentation.			...	0	89	0	0	68	543	15	69	0	8
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using lime and iron as a coagulant.	14.3	0.7	4.	475	4,700	24	31	600	550	11	97	0	4	62	5,500	45	670	11	79
Toledo, O.	170,000	Maumee River	Mechanical filtration.	14.1	2.0	8.	11	270	Combined with the sedimentation.			70	26	...	0	9	...	3,400	180*	206	2	...
Washington, D.C.	348,460	Potomac River	Sedimentation with slow sand filters.	54.	0.0	96.	13	1,620	..	..	..	30	0	47	0	0	47	5,700	28	585	4	63
Youngstown, O.	80,000	Mahoning River	Mechanical Filtration.	8.0	4.0	3.	25	1,300	3	25	1,300	45	24	78	0	0	66	13,500	53	96	2	7

*NOTE:—The high numbers of Bacteria noted at Toledo were due to "negative results" obtained with hypochlorite during a part of March.
The Mortality statistics at New Orleans include "NON RESIDENTS."
Coagulant was applied to the water as it entered the Sedimentation Basin at Harrisburgh on three days in March.

PERSONAL HYGIENE.

PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Concerning Breathing. In the abounding literature produced by expositors of popular hygiene, the subject of breathing fills a large place. Breathing exercises are constantly prescribed, and it is claimed that they will do a great deal for one who faithfully practices them. There is so much obvious extravagance in such statements that the whole matter calls for review in a judicial spirit. This is the more true because teachers of breathing are very apt to mingle occultism with their science, their cult having oriental traditions.

It is necessary to distinguish clearly between the mechanical and the chemical effects which attend special forms of breathing. It is necessary also to distinguish between DEEP breathing and FORCED breathing. The volume of each breath may be increased to three times the habitual amount, but if the period of each breath is prolonged to three times the ordinary duration, there is no absolute increase in the volume of air per minute. Such an exercise involves DEEP but not FORCED breathing. Breathing is forced when the absolute quantity of air is decidedly increased beyond that which instinct dictates, the will being applied to the proceeding. The effects of deep respiratory movements with no increase of absolute ventilation are chiefly mechanical; real forced breathing leads to chemical changes in the blood.

Contrary to the natural suppositions of the layman, it is the movement rather than the composition of the blood which is affected by deepened breathing. Even the indolent person unconsciously keeps the oxygen of his blood close to the possible maximum, and the carbon dioxide at a percentage which may be called normal. An occasional deep inspiration does not much alter the dissolved gases but it does accelerate the blood flow. We may say somewhat crudely, but still correctly, that we breathe blood as well as air; that when we create space in the chest it is to be filled only in part by air and in some degree by blood which has been hurried onward in the veins. The quicker the movement of the chest wall and diaphragm the more marked will be the impetus given to the venous blood.

The exhilarating reaction secured in singing is probably due to this factor, the necessity for filling the lungs in the briefest possible time causing the sharpest form of inspiration with maximal suction on the veins.

Just in this connection may be noted a strong point in favor of nose-breathing. It may seem absurd to say that it is better to breathe through the nostrils because it is more difficult. Nevertheless this is the literal truth—and for a simple reason. A certain impediment to the entrance of air to the bronchial tree is distinctly desirable, since it emphasizes the dilating effect of inspiration upon the thoracic vessels. An attempt at inspiration with closed glottis illustrates an extreme case in which the air-cells are not allowed to expand and the stretching of the vessels must be as great as possible.

One may probably alter considerably the habitual expiratory capacity of the chest. It is apparently wholesome to form the habit of not letting it contract to its minimum girth, in other words, the habit of breathing above a high base line. This practice keeps the lung-tissue stretched and tends to keep all its blood-vessels, lymphatics, and air sacs patent. Occasional deep breaths confirm the good effect upon the vital resistance of the lungs. The sound heart doubtless works most efficiently in a well-rounded chest, being assisted in diastole, and being abundantly able to contract against the slight pulmonary tension. Moreover the task of the right ventricle must be lightened when it pumps into a pulmonary system which has been moderately extended from without. Widened pulmonary capillaries must mean lower linear velocity for the corpuscles within and a better guarantee that time is afforded for oxygenation.

Dr. Henderson has shown us that forced breathing leads to very peculiar and chiefly undesirable results. It affects but little the oxygen content of the blood, while reducing the carbon dioxide in a marked degree, and leading to the condition known as acapnia. Mental confusion and even unconsciousness may be produced. These cerebral effects have been deliberately sought by some enthusiasts. A very mild exercise tending toward the production of acapnia may favor sleep, but it is hard to justify any active efforts to induce a condition so profoundly abnormal. The power to breathe deeply during muscular activity is essential to the endurance of such activity and is most naturally gained as a part of the general training. Its employment is instinctive, and the accompanying conditions are totally unlike those of genuine forced breathing.

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American Public Health Association

ANTI-TYPHOID VACCINATION IN THE AMERICAN ARMY.*

By MAJOR FREDERICK F. RUSSELL,
Medical Corps, U. S. Army.

Typhoid fever is one of the diseases which leaves behind it a very considerable protection against subsequent infection. Second attacks occur just as they do after smallpox, but they are not very common. Dreschfeld, quoted by Osler, says, "Of 2,000 cases of enteric fever at the Hamburg General Hospital, only fourteen were affected twice and only one three times." In view of this high grade of immunity following natural typhoid, it is not surprising to find that studies looking to the production of artificial immunity were undertaken early in the history of modern bacteriology. Pasteur's success in immunizing animals aganist anthrax led Fraenkel and Simons, as early as 1886, to investigate the question of producing artificially an immunity against typhoid. Using rabbits in their experiments, they found that small sub-lethal doses conferred on these animals protection against subsequent fatal doses. In the same

*Read at 38th Annual Meeting, American Public Health Association, Milwaukee, September, 1910.

year Beumer and Peiper succeeded in immunizing mice. At that time they suggested the use of sterilized cultures, in place of living ones, and considered the possibility of its use on human beings.

Nothing of any great value was accomplished in these early days, since our knowledge of toxins, antitoxins, and immunity in general was so fragmentary. It was not until after Pfeiffer had shown that the toxins of cholera and typhoid bacilli were not soluble, as is diphtheria toxin, but were integral parts of the bacillary substance, that real progress in immunization against these two diseases became possible. Up to the time when Pfeiffer published his classical experiments, there was no method of examining the blood serum of man or animals adequate for the detection of protective substances in the blood.

It was not until 1896 that Pfeiffer and Kolle, in Germany, and Sir A. E. Wright, in England, reported successful attempts to protect human beings. The paper of Pfeiffer and Kolle, to be sure, describes only two cases, but it is so comprehensive that it covers the field completely. They showed not only that agglutinins were produced in the blood in response to the inoculation of dead bacteria, but that the bacteriolytic power of the blood was also raised in the same way as it is during an attack of typhoid fever. Haffkine, working in India, had cleared the ground by showing that it was possible to protect human beings against cholera by inoculating them with living cholera cultures. Sir A. E. Wright announced his first inoculations of men with typhoid bacilli in 1896, but it was not until 1897 that he published a paper bearing directly on the subject. At this time he reported the results of anti-typhoid inoculations in 18 persons. Although Pfeiffer and Kolle and Haffkine have contributed a great deal to our knowledge of the subject, it is nevertheless true that our progress in this field is due largely to the energy and persistence of Sir A. E. Wright. In 1898 he inoculated about 4,000 men of the British Indian Army, and secured very good results. Soon after this came the Boer War, and Wright furnished vaccine for as many volunteers as could be obtained—about 100,000.

Even this very extensive trial of the method did not give convincing results, and many of the profession remained sceptical of the value of the method. The reports from different military organizations in South Africa were widely at variance with one another, as at times the inoculations seemed to give good protection, and at other times no good effect was noted. The situation was difficult to explain, if one accepted the statistics as true, and no satisfactory explanation has been forthcoming until recently. Sir William B. Leishman, of the Royal Army Medical

Corps, was associated with Wright at this time, and the actual preparation of almost all of the vaccine used in South Africa fell to him. He now believes that "the methods then employed in the preparation of the vaccine may have resulted in considerable variations in its vaccinating efficiency. Some men may have received but slight and transient immunity, while others were protected in as high a degree as the system was capable of." At the end of the Boer War, in 1902, the general lack of agreement as to the value of anti-typhoid vaccination led to a suspension of its use in the army. Several commissions have since been appointed to study the problem; up to the present time, three reports have been made, and all of them have been favorable. The method has been reintroduced into the English army, and during the last few years the anti-typhoid campaign has been actively pushed.

In order to understand the variation in the amount of protection obtained at that time, it is necessary to consider for a moment the manner in which the vaccine is prepared. Wright's original method consisted in growing the bacillus in broth for three weeks and then sterilizing the cultures by heating them to 60° C. in a water bath for one hour. The time of incubation was afterwards shortened to two days. The system worked well so long as only small quantities were needed. When larger batches were to be made, Wright devised an ingenious paraffine thermometer, which consisted of a bulb and tapering stem, and which was placed inside the culture flask; this latter was filled with paraffine with a melting point of 60° C. As soon as the culture reached that temperature, the paraffine melted, and the bulb, which up to that time had acted as a float, filled with the culture and sank to the bottom of the flask. The contrivance should have worked according to the plan, but as a matter of fact it often failed, and it is now believed that much of the vaccine was overheated. Subsequent experiments by Leishman and his co-workers have shown that a vaccine may be greatly weakened by too much heat, and, consequently, they never subject their vaccine at the present time to more than 53° C. for one hour.

The fact that some of the vaccine used by both the English and the Germans may have been overheated, and thus weakened, gives the best explanation of the occasional unsatisfactory results which were obtained in the early days of this work. We now have no trouble in producing uniformly good and potent vaccine.

Following the South African War, the next extensive use of anti-typhoid vaccine was in the German Colonial Army in South West Africa during the Herero campaign from 1904 to 1907. In 1904, the number of cases of typhoid among the troops was 226, in spite of the fact that all the

usual hygienic measures which it was possible to carry out were brought to bear, and in spite of the fact that the medical officers were given an unusual amount of authority and means to fight the disease. The practical failure of the usual means of control caused the military authorities to submit the entire question to Professor R. Koch, who recommended the prophylactic use of anti-typhoid vaccine. It was largely due to this measure that the number of cases fell from 226 in 1904, to 43 in 1907. The troops numbered 16,496, and of these 7,287 were vaccinated. The vaccine used was prepared according to the method of Pfeiffer and Kolle, and as compared with that used by the English and by us, the dosage is rather large, and the resulting reactions are much more severe and troublesome. The Germans had 1277 cases of typhoid among the troops; and a study of the distribution of the cases shows clearly the undeniable advantages of anti-typhoid vaccination, even though the German results are not as good as have since been obtained in India and in our own service. The percentage of cases among the uninoculated was 9.84, while among the vaccinated it was only 5.09, or about half as high. This, however, does not tell the whole story, since when the fever did occur among the vaccinated, it was distinctly milder, and complications were only half as frequent.

The results obtained by the English in India up to June, 1908, have been published, and they show that among 12,083 men, 5,473 had been vaccinated and 6,610 had not. Among the non-inoculated, the case incidence was 28.3 per thousand, and among the vaccinated it was 3.8. There were 21 cases, with 2 deaths, among the vaccinated, and 187 cases, with 26 deaths, among the non-inoculated. Of the 21 cases among the vaccinated, all but four had received but one dose of the vaccine. It is well known that one dose does not give a very high degree of protection. Four of the cases had received 2 doses, and in them the disease was very mild and ended in recovery. Complete reports of the English results in India have not yet been published, but Leishman has stated this year that the ratio of attacks in the inoculated to those in the non-inoculated is less than one to five, and that they have statistical evidence of a distinctly higher and more uniform grade of immunity than was formerly the case.

In our own army the vaccination against typhoid fever was begun in March, 1909, and up to the present time (August 1, 1910) we have records of the vaccinations of 11,771 persons. The total number of doses administered is 31,556. It has been our practice to give 3 doses at 10 day intervals to as many volunteers as possible. We find that 75% have received the full course of 3 doses; 21% have received 2 doses, and only 4% have

failed to receive more than one dose. The failure to receive the second dose has sometimes been due to refusal, but just as often to change of station, discharge, desertion, and like causes. The first dose is 500,000,000 bacteria, the second and third, 1,000,000,000 each. The vaccine is prepared by growing a selected non-virulent strain of the bacillus on agar in flasks for 18 hours and then emulsifying the growth in salt solution. The vaccine is standardized by counting the bacilli, and is sterilized at 56° C. for one hour; ¼% of tricresol is added as a preservative. In the use of this method no untoward results whatever have been reported.

There is a widespread idea that the reaction immediately following each dose of the vaccine is rather severe and unpleasant, but such has not been our experience. A careful record has been kept of every dose given, the results of which are shown in the following table:

REACTION.

	Absent	Mild	Moderate	Severe
First dose.........	62.7%	32.0%	4.5%	0.7%
Second dose......	68.6%	25.8%	5.0%	0.6%
Third dose........	79.0%	16.7%	4.1%	0.2%

The number of moderate (4.5) and severe reactions (0.5) together is only 5%, and thus 95% of the men had little or no fever or discomfort, aside from the local reaction. This consists of a somewhat red and tender area at the point of inoculation which is rarely troublesome and usually disappears in from 48 to 72 hours.

When the occasional severe reaction does occur, it need give rise to no alarm, since the symptoms begin to subside in a few hours, and, as a rule, completely disappear in two days. The concomitants of a severe reaction may include fever, chills, herpes, nausea, vomiting, diarrhea, and albuminuria. Hysterical attacks have also been occasionally reported. The symptoms of a mild reaction may best be described by saying that the individual feels as if he were coming down with a cold, but his quick recovery indicates that his indisposition was merely the effect of the vaccine.

It is too early to judge of the full effect this measure may have on the health of the Army. I shall merely state that about one-seventh of the force has been vaccinated, and that among these men we have had 3 cases of typhoid, while, during the same length of time, we have had 306 cases among the unvaccinated. This gives a ratio of almost 16 to 1 in favor of those vaccinated. The 3 cases were all mild and ended in recovery.

The first case was probably infected immediately before or after receiving the first dose, and was admitted to the hospital soon after the second; the diagnosis was confirmed by isolation of the bacilli from the stools. The other two cases were so mild that, in the absence of blood cultures, there remains some doubt as to the correctness of the diagnosis.

We do not yet know how long the immunity will last. The agglutinins and other antibodies present in the blood serum diminish greatly or disappear after about a year. This does not help us in estimating the duration of the protection, since the antibodies exist in smaller quantities and disappear sooner after typhoid than after vaccination, yet the naturally acquired immunity is, as a rule, present for life. The experience of the English would seem to show that the men were still protected after the lapse of three years; and we do not know how much longer the immunity may last. If it does last for three years or more, as seems probable, that is sufficient for our purpose, as it is improbable that any modern war will last longer than that.

It has now been sufficiently demonstrated that in anti-typhoid vaccination we have a simple, harmless, and effective means of prophylaxis, which can be used as a supplement to all the usual sanitary measures. It is not a measure which will supplant any of the usual measures, but it will prove a valuable adjunct to them, and will be of particular value where it is impossible to carry out the regular hygienic precautions.

In civil life, as well as in the Army, there are many situations where the vaccine may now be used. We have passed through the experimental stage, and should not allow our practice to lag behind our knowledge. All persons whose vocations expose them particularly to typhoid should certainly be vaccinated. Richardson and Spooner have shown the advantage of the measure when used for the protection of physicians, nurses, and hospital attendants. Laboratory workers should also be protected. In isolated communities, in insane asylums, in gangs of railroad employees, in industrial and mining villages, the vaccine may be used to advantage. One of the most hopeful fields for its use is among travelers, and among children and young people before they go into the country or to the seaside for the summer. Children are weighed to determine the dose and given a quantity proportional to their body weight, using a hundred and fifty pound man as a standard. We have never, as yet, had any severe reactions in children, in fact, they do not seem to be inconvenienced by it to any extent.

This vaccination will undoubtedly find its greatest usefulness when applied to an army in the field. It is unnecessary to mention the terrific ravages made by this disease in military campaigns and in camps of mobil-

ization. The conditions of camp life are such that the fever spreads so rapidly by contact that we practically have to deal with a contagious disease. In the Spanish War there were 20,738 cases, with 1,580 deaths, among 107,973 men. This is equivalent to 19.26%, or nearly one case to every five men. In the Boer War the English had 31,000 cases, with 5,877 deaths. In the Franco-Prussian War the Germans had 73,396 cases, with 8,789 deaths. In fact, 60% of their total mortality was due to this disease.

It is then a matter of almost common knowledge that, in the past, typhoid has decimated the ranks in every campaign, and we cannot afford to neglect any measure which will help us to control the disease.

After our experience of the last year and a half, during which time we have prepared large quantities of vaccine at the Army Medical School, and administered over 31,000 doses of it, we feel that we have a measure which is safe, practicable to carry out, and satisfactory. We believe it will help materially to reduce our morbidity and mortality and place the Army on a more effective and efficient basis.

MAYORS AND MUNICIPAL HEALTH.*

By JOHN A. KINGSBURY,
Assistant Secretary of the New York Charities Aid Association.

Is there a health officer who has not been repeatedly discouraged almost to the point of giving up his struggle for better health conditions in his city or state, because of his inability to secure the necessary financial support for his work? Is there a health officer who has not vainly implored and importuned the mayor and other officials who control appropriations, for the share of the city's funds to which the health department is justly entitled? Assuming that our health officers are working courageously and conscientiously in behalf of the public health, the answer to these questions is found in the bulletin recently issued by the United States Census Bureau on "Statistics for Cities for 1907." This bulletin contains the following enlightening figures for the 47 cities in the United States with a population between 50,000 and 100,000:

	Number Employed	Amt. Appropriation
Firemen	4,899	$4,632,497
Police	4,822	4,262,322
Health Inspectors	247	842,842

There can be no more eloquent evidence than is borne by these figures of the failure of those who control finances in cities to appreciate the relative importance of the protection of property as against the protection of health. We rejoice in the liberal appropriations for police protection; we rejoice in the generous support given for the protection against fire; but we deeply deplore the lamentable lack of funds for the protection of public health. We need not give ourselves much concern, however, about the support of the police department, or of the fire department; merchants and manufacturers who have their stores and shops to protect from burglaries will see to the former, and the latter will be taken care of by the fire insurance companies. But who will look after the health of the city, and see that the health department receives its share of financial support? How shall we get the ear of the mayor, and how shall we bring him to a full realization of the importance of municipal health problems?

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

Too long has the health department remained in a second or third rate position. Too long has the health officer been regarded as a necessary nuisance to be endured, at least during epidemics and plagues. This situation is due to ignorance, which in turn is largely due to our failure to get the facts before the men who control the funds, and to state these facts in such form as to make them convincing. This condition must not be tolerated longer; we must enlighten those who have their fingers on the purse strings.

To this end I propose a conference of mayors and other municipal officials who have to do with the fiscal affairs of cities, for the consideration of municipal health problems; a conference to be held in every state in this nation and in neighboring nations.

An editorial in the New York Evening Post recently asked: "Why should mayors spend time and public money in listening to information that is accessible enough in printed form?" The editor, responding to his own question, said: "The answer is that personal contact among a group of men doing the same work is a way of stirring the enthusiasm that begins to flag under the strain of daily routine. From a two-days' threshing-out of problems, theories, and remedies, a mayor may bring back a vivid realization of public need that no number of printed pages can supply."

The mayor of a modern municipality should be in touch with the times, and abreast of this age of sanitary science, and informed on all questions concerning the health, happiness, and comfort of the people; but there are so many things demanding the particular attention of each particular mayor. "How," he protests, "am I to judge which to attend to?" That is his concern. Ours is, "How is his particular attention to be drawn to the problems of public health?"

To this end I wish it were possible to bring the mayors from all over the land to an annual meeting of the American Public Health Association, and thus get them in touch with the experts of the country in this line of work. I wish it were possible for the American Public Health Association to arrange for the assembled mayors the very best and most practical program, dealing with municipal health problems, that it is possible to plan. Who can measure the effect of such a meeting if it could be brought about? If you could but concentrate the attention of the mayors of all American cities on this subject for one week—aye, for one day; if you could show them all the possibilities in the promotion of public health work in life saving; and, if you could show them, if you please, its political possibilities, what a tremenduous influence for good you could exert, and what a marked gain there would be in this whole field of social endeavor!

Obviously, such a great gathering is quite impossible. Consequently, it looks as though we were doomed to gather together here from year to year, reporting more or less progress, and continuing in the endeavor to enlighten each other. Nevertheless, as sanitarians, we occupy a most enviable position. We actually have more knowledge that we know what to do with, while in most callings the difficulties encountered are chiefly from lack of knowledge. As soon as the knowledge is acquired in most lines of endeavor it spreads like a western forest fire. Compare the rapidity with which the world became acquainted with wireless telegraphy, with the airship, and with a hundred modern inventions in the industrial world, with the slowness of the public to grasp the meaning of the great blessing which was conferred upon humanity by the wonderful discoveries of the late-lamented Dr. Robert Koch, and his contemporaries, in the field of bacteriology and preventive medicine. Compare the countless millions that have been put into the exploitation of knowledge that can be commercialized, with the few thousands that have been reluctantly provided to fight tuberculosis, bubonic plague, smallpox, and other plagues. The world grasps eagerly for every bit of new information for its material development, and is revolutionized. Too often it turns a deaf ear and a skeptical eye upon the man who has made a discovery which will increase the sum total of human happiness by lessening human misery. To the man who gratuitously offers his knowledge to society for its benefit, fame perhaps eventually brings her wreath of laurels, but, as usual, she finds her poet dead.

Notwithstanding this situation, which we have long endured, we are coming gradually to appreciate the truth of what Dr. Osler has so well said: "Measure as you may the progress of the world—materially, in the advantages of steam, electricity, and the other material appliances; sociologically, in the great improvements in the conditions of life; intellectually, in the diffusion of education; morally, in the possibility of higher standards of ethics—there is no one measure which can compare with the decrease of physical suffering in man, woman, and child, when stricken by disease and accident."

It must therefore strike sanitarians as an exceedingly strange state of affairs that in the field of preventive medicine there is an abundance of knowledge that cannot be given away. That is, indeed, a sad situation. What a pity some man could not have patented the fresh air treatment for tuberculosis! He would have been many times a millionaire, and his treatment would have been, no doubt, more popular than Peruna, in which event tuberculosis must long ago have disappeared. In some directions, however, headway has been made. There has been given to the world

a great deal of knowledge concerning smallpox, diphtheria, and, to a great extent, typhoid, and certain other diseases. But this has been done without much help from private capital. It is the public purse that must be looked to for the exploitation of the valuable store of knowledge that has accumulated. Hence, in order successfully to exploit this knowledge, a way must be found to get hold of the man who holds the public purse strings, and to make of him a staunch ally. In most cities that man is the mayor, perhaps in association with other city officials. But, how is his aid to be had, since we can hardly hope to secure the attendance of all these city officials at an annual meeting of this Association?

The next best thing should be done. The best program which we can plan should be presented to the mayors and other prominent city officials in every state, in a conference assembled for the express purpose of its presentation and of its discussion.

Experience has proved that this can be done. Such a conference was recently held in New York State and met with unqualified success. The Conference of New York Mayors, held at Schenectady last June, was attended by thirty-four out of a possible forty-five mayors of second and third class cities, and eight additional cities were represented by officials other than the mayor, making a total representation of forty-two out of forty-five cities. If you want to find out how this phenomenal attendance was secured, write to the Mayor of Schenectady, or to the New York State Charities Aid Association, which was largely responsible for the program and other important details. This conference was, in fact, a splendid example of what can be done through co-operation between an official body and a private organization.

The Conference was called by Mayor Duryee, of Schenectady, and the sessions, extending over two days, embraced a wide variety of subjects pertaining to public health. As a rule, some expert of national reputation was called in to present a carefully prepared paper or an address of about twenty minutes' length. This was followed by informal discussion by mayors, health officers, and other municipal officials, each limited to five minutes.

Among the speakers and the topics discussed were the following:

Mayor Duryee, on '.The Protection of Life and the Protection of Property."

Mr. Frederick L. Hoffman, Statistician of the Prudential Life Insurance Company, on "The Prevention of Diseases by the Elimination of Dust."

Mr. Lawrence Veiller, Secretary of the National Housing Association, on "Housing and Health in Cities."

Professor C.-E. A. Winslow, of New York University, on "Waste of Life Capital in American Industries."

Dr. Luther H. Gulick, President of the National Playground Association, on "Municipal Aspects of Rest and Recreation."

Dr. Livingston Farrand, Executive Secretary of the National Association for the Study and Prevention of Tuberculosis, on "Municipal Duties in the Conquest of Tuberculosis."

Dr. Albert Warren Ferris, President of the New York State Commission in Lunacy, on "First Aid to the Insane."

Professor Walter F. Willcox, of Cornell University, on "Methods of Determining Economic Losses from Preventable Diseases."

Hon. Eugene H. Porter, New York State Commissioner of Health, on "The Relation of State Health Authorities to Local Health Authorities."

Dr. George W. Goler, Health Officer of Rochester, N. Y., on "How to Get Competent Health Officers."

Hon. Homer Folks, Secretary of the New York State Charities Aid Association, on "The Organization and Work of an Effective Health Department."

Professor Charles Zueblin, on "The Obligations and Opportunities of Local Officials."

This conference was timely, and it is evident that it dealt with a timely subject. It has stamped public health upon the public mind as a question for first consideration in New York state. Five years ago any one who had suggested that in 1910, 75% of the mayors of New York State, in conference assembled, would have adopted such resolutions as those passed at the Schenectady Conference, would have been deemed a dreamer of dreams. Those resolutions endorsed the municipal control of tuberculosis; in fact, the entire program of the State Charities Aid Association, the watchword of which is "No Uncared-for Tuberculosis in New York State in 1915," received unqualified approval. They endorsed the housing movement, the extension of public parks and playgrounds, and the medical inspection of public schools. They pledged their unqualified support of the movement for a national department or bureau of health, and for the protection of the cities' food supply. They went on record as strongly favoring special training for health officers, and permanent tenure for such officials: and as an eminent authority has recently said, "The education of health officers is indeed one of the crying needs of rural America; the removal of this office from politics, dignifying it by providing suitable compensation and definite preparation for its duties would save life and health as no other single reform in the field of social welfare, with the possible exception of the further socializing of the schools." Finally, the resolution passed by these mayors pledged them to use their utmost endeavor to secure much more liberal appropriations for health work in cities.

In a conference such as I have proposed, city officials who control the expenditure of public funds can be most emphatically impressed, not only with the great public need in this direction, but also, as I have already

suggested, with the political possibilities which are inherent in it. Dr. Devine, in his recent book, "Misery and Its Causes," has stated the whole argument which should confront the mayors in an admirable manner, and I can do no better, in closing, than to quote it:

> "No community," says Dr. Devine, "is so poor that it can afford to permit typhoid for the lack of a filter, or inefficient children for the lack of good schools, or criminals for the lack of playgrounds, or wayward girls for lack of protection, or exploited childhood for the lack of a factory inspector, or industrial accidents for lack of a compensation law or an insurance system. These things, I repeat, are not luxuries. * * * * * * Economic prosperity is essential, and I would be the last to argue in favor of reckless waste of resources. Sanity in expenditures is as necessary in social betterment as in private business. I urge the sanity, the reasonableness of combatting the causes of misery, that we may not have to pay for its consequences. We may send children to school, keep them out of factories, provide them with playgrounds, operate for their adenoids and fit them for useful trades and occupations; or we may keep our hospitals and courts and prisons and charities going at their maximum capacity. We are right or wrong in the position that these are alternatives. If we are right, these expenditures and enactments, designed to change the adverse conditions, are serious policies; not indulgences to be allowed half good naturedly and half indifferently, if there happens to be plenty of spare money about not required for other purposes. Of course, the money must be available or it cannot be spent, but if the advocates of better social conditions, of education and health and room and leisure and recreation and reasonable standards are in earnest, if they make it clear that the irreducible minimums of these things which they seek, and which they seek not only through municipal expenditure, but in a large part through voluntary co-operation and individual initiative, represent investment and not luxury, they will, I think, escape the reproach of youthful extravagances and of having neglected finance for the more alluring but less firmly grounded social science."

If municipal health problems are placed before the mayors of the cities of any enlightened commonwealth in the light here suggested by Dr. Devine, I believe that the program is sure to capture them. To get this movement under way in any state, it is necessary only to present its possibilities to some wide-awake and popular mayor,—and it might not hurt the cause to mention the fact that the Democratic leaders of the State of New York are now talking of the mayor who originated the Schenectady Conference as a desirable candidate for Governor of the Empire State.

VITAL STATISTICS IN THE PROMOTION OF PUBLIC HEALTH.

By WILLIAM H. GUILFOY, M. D.,
New York, N. Y.

Newsholme has defined Vital Statistics as the science of numbers applied to the life history of communities and nations; Wilbur, as the Cinderella of modern public hygiene, sitting in the chimney corner sifting the ashes of dusty figures while the proud sisters, Bacteriology and Preventive Medicine, go to the ball, and talk about the wonderful things they have done. The term might also be defined as the numerical registration and tabulation of population, marriages, births, diseases, and deaths, coupled with analyses of the resulting numerical phenomena with the end in view of "searchlighting" the path of sanitary progress.

The basis of all vital statistics is the population as furnished by the census, with its various subdivisions as to locality, age, sex, race, civil condition, density, occupation, and similar information. During the intercensus years, estimates must be made of the population based upon an arithmetical or geometrical progression; upon this base must take place the building of a superstructure, in fact, a store-house, containing the essential requisites of all knowledge of health, fecundity, prosperity, disease, and death. This thought prompts the query, "If a life assurance company can erect in the City of New York a palatial skyscraper, paid for by its knowledge of mortality rates transmuted into dollars and cents, why should not the federal government be able to erect at its seat a monumental temple of vital statistical lore, surpassingly beautiful and practical, and paid for by the increased economic value of the health of the nation?"

Marriage statistics form an interesting part of the subject, by reason of their bearing upon the increase of the population and their use as an index of worldly prosperity. The full registration of births occurring in a community is of great value from the viewpoint of the vital statistician, and yet it must be admitted that very few of the cities, not to speak of the states, in the United States, are in receipt of 90 per cent. of reports of births occurring within their limits. In Great Britain and in Europe the ordinary measure of the mortality among infants under one year of age is the number dying per 1000 births, as reported during the year; in the United States at the present time such a standard could not be set up in any one

state, and in very few cities. The birth rate of a community has a far-reaching influence upon the increase of population, age, and sex constitution of its people, and questions of social interest, such as fecundity of native "stock", illegitimacy, and divorce.

The most important subject with which this paper deals is the consideration of the question of mortality and mortality rates. Sweden, in the year 1749, first entered the field of mortality statistics; and probably the first tabulation of deaths must have been brought about by the occurrence shortly before this date of a death-dealing epidemic of such magnitude that it aroused a desire to know how many died—a desire resolving into a demand—with the result that for 150 years death rates at various age-groups are in existence. It is not surprising that the lowest rate of mortality in Europe is to be found in the Scandinavian peninsula; in other words, where the lamp of vital statistics was first kindled, there is to be found a progressively healthy and vitally vigorous nation. If the pathway be made light, then shall the feet of the hygienist not go astray in the teaching of man to lead a happier, healthier, and longer life.

The chief and noblest aim of the vital statistician is to point out how, when and where the best efforts of the health officer and hygienist may be directed to conserve health; his analysis of returns will show what forces have been at work in the past tending toward the suppression of all the various forms of destructive disease, at what psychological moment these forces should be put into operation, and at what point action should be begun. Deaths and causes of deaths are facts which may be classified, tabulated, and analyzed, and the statisticians' presentation of the various factors influencing health and life creates laws which may not be disobeyed, save under penalty of painful disease and perhaps death. "Diseases are the iron index of misery," and the complete registration of ALL diseases with attendant conditions of congestive contact, social excesses, vicious indulgences, and hygienic ignorance, shall form in the future the basis of official and philanthropic intervention.

Improved vital statistics is the demand of the hour, and in so far as further progress is made in this direction, so far will corresponding advance be made in preventive medicine. The day of comparing the salubrity of a town, city, state, or nation with that of another by the use of the crude death rate is passed; the constant repetition of the warnings given in the past, that the crude death rate should not be used in this manner, is bearing fruit. It may be, and is, used constantly and properly in the comparison of the mortality of a locality with that of its past, provided no great change has occurred in the sex and age constitution of the population; the two factors last mentioned are the most important in the determination

of the death rate of a locality. It has been repeatedly shown that, given two cities with varying age-groupings of the populations, but with exactly the same DEATH RATES at these age-groups, one city will possess a much lower general death rate than the other, due not to more healthful environment, but to the more favorable distribution of ages of the inhabitants; sex distribution modifies the death rate, the presence of a larger proportion of females than males in a population always tending to lower the rate. In connection with this subject, I would earnestly recommend that the Bureau of the Census establish a standard table showing the death rates by sex and by age-groups, the application of which to the returns of cities and states would serve to do away, in a great measure, with the disturbing influence of these two factors. Some of our cities display in bold-faced type upon the front page of their weekly or monthly reports—as if inviting attention to the extreme healthfulness of the locality—a general death rate of 10 per 1000, which means that either every child born attains the age of one hundred years, or else that the average age at death is one hundred, or if some die in infancy, others must have lived much more than one hundred.

Density of the population is a factor which influences the death rate, a factor which formerly was considered as most directly concerned with increased mortality, and for the correction of its influence upon the death rate mathematical formulas were worked out. It is now viewed as of secondary importance, compared with the immediate hygienic surroundings, the habits, and intelligence of the dwellers; of these latter influences, the infant mortality is a good index. In the City of New York, where the number of persons in one block reaches the astounding mark of 2471 per acre, the number of children dying out of every 1000 births was one-half the number dying in blocks with a density less than one-half; it must be admitted though, that all blocks with a density of 1000 to the acre showed an increase in the infant mortality as compared with that of the entire city. A second factor is the nativity of parents. The infant mortality in a block inhabited by Russian Poles was 166; by Italians 165; by Irish and German mixed 204; by wealthy native white 50; by middle class native white 121; by native colored 319. The influence of the presence of the colored population upon the death rate is well known, and the experience of Southern cities is amply corroborated by that of areas in Northern cities occupied by blacks; the highest infant mortality is always to be found in San Juan Hill, a typical colored section.

Hoffman, in his paper on the "General Death Rate of Large American Cities," enumerates the following factors as affecting the rate: Size of city, density of population, latitude, longitude, elevation, rate of annual

increase, proportion of males, of foreign born, of foreign parentage, of colored, of illiterates, of male wage earners, of ages, the mean annual maximum and minimum temperatures, and mean annual relative humidity; so that the general death rate, when analyzed, is found to be based upon a very complex set of props, and the influence of the most important must be measured before accepting of it as an index of mortality.

The vital statistician must prepare his tables of mortality in such a way as to show the CAUSES of death, not only by weekly, monthly, and yearly occurrence, but he must, for purpose of comparison, furnish quinquennial or decennial figures corrected to correspond with fluctuations of the population; tables showing the number of deaths and rates at divisional ages, especially among infants and children under five years and between five and nineteen years, should be compiled. Of surpassing importance is the registration of deaths by house and street, with cause and age specified, in order that the epidemics may be traced, studied and prevented. Tables of deaths from the principal causes should be prepared, arranged according to race, nativity of deceased, and parents of deceased; deaths from accidental causes should be presented in detail; deaths in institutions should be charged up against the locality where the deceased resided before admission; areas of sanitary interest should be mapped out and mortality and morbidity rates published; mortality rates, arranged according to specific occupation and by age divisions, are much sought for at present, and will continue to be sought by reason of the awakened public interest therein; suicide tables should be printed according to the method used, nationality and age tabulated, but not excluded from the regular mortality tables published. I hope the day is not far distant when the Bureau of the Census will be in a position to redistribute deaths occurring in any part of the country to their proper place.

Before closing, I should like to call attention to the results obtained in the City of New York (since the organization of the Board of Heatlh more than forty years ago,) the rates and causes of death of the first decennium being compared with those of the decennium just ended. The crude rate has decreased from 26.61 to 16.21, almost 40 per cent.; the decrease per cent., at age-groups representing infancy, childhood, youth, maturity, decline, and old age, was as follows: Infancy 45, childhood 42, youth 32, maturity 25, decline 3, old age 6; the death rate among females, as compared with males, is lower in each decennium and at each age-group; the per cent. reduction in the rate among the females has equaled or surpassed that among the males at every age-group in the comparison. Under the age of fifteen years, and above the age of forty-five, the degree of reduction is almost the same, while between twenty-five and forty-five

years of age the reduction is much greater among the females; by far the greatest saving in human life has taken place before the age of forty-five, and above this latter the saving is comparatively very small. Those causes which the Department of Health has sought to eradicate have reflected their disappearance or abeyance in the absent or diminished mortality of smallpox, typhus fever, Asiatic cholera, typhoid fever, diphtheria and croup, measles, scarlet fever, whooping cough, tuberculosis and diarrheal diseases,—causes which affect mankind before and during maturity; while, on the other hand, those in the control of which no official interference has been attempted have increased tremendously, especially cancerous, circulatory, and urinary diseases. To a lesser extent the mortality from acute respiratory diseases has increased; judging from calculations made two years ago the decreased mortality from tuberculosis at the ages over 45 years has had the effect of turning what would have been an increase from all causes to a very slight reduction at the decline period of life.

It is also evident that the entrance of the female into the business world has not been followed by an increased mortality at any age-group, as compared with the male; and if we consider the ages 25 to 45 years as the most productive in a social and economic sense, we find that it is at these ages that the decrease in the mortality of the female, as compared with the male, is greatest. The work assumed by the female has not added to her mortality, it has brought greater physical comforts and increased her span of life.

The rungs at the bottom of the ladder of life are being carefully looked after; those at the middle of the ladder have been neglected; the physical welfare of the man has been lost sight of in the multitude of attempts at prolongation and betterment of the physical properties of the child. Words of praise should be bestowed upon these official and philanthropic endeavors to make the coming generation "fit"; but is it not time that the vital statisticians should show us by investigations that the mortality from the diseases affecting middle age is increasing—the diseases of the kidney, heart, arteries, brain and digestive organs, which are growing apace—in order that man may be educated into following the ordinary rules of morality, sobriety, and moderation in all things, even in work? Light, more light, is necessary, otherwise "the millenium when," as Isaiah says, "the child shall die a hundred years old," shall never materialize.

Laboratory Section

REPORT OF THE JOINT COMMITTEE ON MAILING INFECTIOUS MATERIAL.

Your Committee has to report that the proposed modifications of the regulations for the mailing of infectious material have finally been promulgated by the Post Office Department, under date of April 22, 1910.

The committee believes that its efforts have resulted in the promulgation of regulations which have been considerably simplified, and which are a decided improvement over those formerly enforced.

The committee was successful in having the privileges of the mails extended to include the transmission of infectious material to and from federal, state, municipal, and other laboratories, upon the issuance of a formal permit by the Postmaster-General.

A copy of the new regulations is herewith appended.

Your committee recommends that it be discharged.

Respectfully,

JOHN F. ANDERSON,
for the Association,

MARSHALL LANGTON PRICE,
for the Laboratory Section.

ADMISSION OF DISEASED TISSUES, ETC., TO THE MAILS OF THE UNITED STATES.

SECTION 495, P. L. AND R., AS AMENDED BY THE POSTMASTER GENERAL'S ORDER, NO. 3064, APRIL 22, 1910.

Section 495, Postal Laws and Regulations, is hereby amended to read as follows:

Specimens of diseased tissues may be admitted to the mail for transmission to United States, State, municipal, or other laboratories in possession of permits referred to in paragraph 3 of this section, only when inclosed in mailing cases constructed in accordance with this regulation: PROVIDED, That bacteriologic or pathologic specimens of plague and cholera shall under no circumstances be admitted to the mails.

2. Liquid cultures, or cultures of micro-organisms in media that are fluid at the ordinary temperature (below 45 C. or 113 F.), are unmailable. Such specimens may be sent in media that remain solid at ordinary temperature.

3. No package containing diseased tissue shall be delivered to any representative of any of said laboratories until a permit shall have first been issued by the Postmaster General certifying that said institution has been found to be entitled, in accordance with the requirements of this regulation, to receive such specimens.

4a. Specimens of tubercular sputum (whether disinfected with carbolic acid or not disinfected) shall be transmitted in a solid glass vial with a mouth not less than one inch in diameter and capacity of not more than two ounces, closed by a cork stopper or by a metallic screw top protected by a rubber or felt washer. Specimens of diphtheria, typhoid or other infectious or communicable diseases or diseased tissues shall be placed in a test tube made of tough glass, not over one-half inch in diameter and not over three and one-half inches in length, closed with a stopper of rubber or cotton and sealed with paraffine or covered with a tightly-fitting rubber cap.

b. The glass vial or test tube shall then be placed in a cylindrical tin box made of I. C. bright tin plate, with soldered joints, closed by a metal screw cover with a rubber or felt washer. The vial or test tube in this tin box shall be completely and evenly surrounded by absorbent cotton, closely packed.

c. The tin box with its contents must then be inclosed in a closely-fitting metal, wooden or papier-mache block or tube, at least 3-16 of an inch thick in its thinnest part, of sufficient strength to resist rough handling and support the weight of the mails piled in bags. This last tube to be tightly closed with a metal screw cap.

5. Specimens of blood dried on glass microscopic slides, for the diagnosis of malaria or typhoid fever by the Widal test may be sent in any strong mailing case which is not liable to breakage or loss of the specimen in transit.

6. Upon the outside of every package of diseased tissues admitted to the mails shall be written or printed the words "Specimen for Bacteriological Examination. This package to be pouched with letter mail. See Section 495, P. L. and R."

REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL DIAGNOSIS OF GLANDERS.

Since the report of this committee in 1907, the methods of bacterial diagnosis have been reviewed and considered. At the outset of this work 150 question blanks were sent to get an expression of opinion from American veterinarians and Health Officers on the methods of diagnosis now in use. Of 150 blanks, 40 were returned. A study of these questions answered shows that mallein holds a prominent place. Microscopical agglutination is used to a very small extent, and the Straus method somewhat extensively in a few places, but in other places only as a last resort in clinical cases.

A few, however, condemned mallein, but in all cases it would appear that they were not justified in so doing for the reasons stated. Whatever method is used, great care must be taken in verifying the bacterial diagnosis with post-mortem examinations. It is a well-known fact that a positive bacterial diagnosis can be made and *Bact. mallei* recovered in pure cultures, when the lesions are but slight or perhaps have not assumed a typical appearance. Wladimiroff has shown that *Bact. mallei* can occasionally be recovered in pure cultures from the bronchial lymph glands that show no gross lesions, taken from horses that have reacted to mallein. It would seem that some of our American veterinarians have been too hasty in condemning bacterial methods now in use, particularly mallein.

The diagnosis of glanders in the living individual consists of one of three procedures, namely:

1. The mallein test.

   (The three indications of reaction should be carefully observed, the reaction usually consisting of two of the three following disturbances: temperature, local swelling, and constitutional symptoms.)

2. Blood tests.

3. A bacterial examination of the discharge from the nasal cavities, or the contents of the skin abscesses of the suspected individual. For this the inoculation of a male guinea-pig by the Straus method is recommended.

It is of interest to report the results in tabular form of thirty independent workers on mallein testing and blood tests.

TABLE I.

Cases of glanders proved by clinical, bacteriological, or anatomic methods and correctly confirmed by mallein, agglutination, or complement fixation.

Reference	Complement Fixation	Agglutination	Mallein Subcutaneously	Ophthalmo Reaction	Cuti-Reaction
Dietrich[1].........	..	..	..	6	..
de Blieck[2]........	8	7	16	22	..
Nevermann[4]......	..	137	..	..	..
Nevermann[5]......	..	119	..	..	..
Nevermann[6]......	75	14	..	..	..
Christensen[7]......	..	..	..	2	..
Schlegel[8].........	..	..	73	..	..
Riemer[9]..........	..	2	..	..	..
Pirl[10]............	..	..	10	..	..
Feist[11]...........	..	..	70	..	..
Kitt[12]...........	..	..	15	..	..
" [13]...........	..	..	151	..	..
Alete[14]...........	..	..	1	..	..
Semmer[15].........	..	..	22	..	..
Preusse[16].........	..	..	37	..	..
de Haan J. Hoogkame[17]......	..	..	25	..	..
Martel[19]..........	..	..	..	10	6
Liautard[20]........	..	..	14	..	..
Lambkin[21]........	..	..	1	..	..
Siegmund[22].......	..	..	1	..	..
McLean[23].........	..	..	1	..	..
—— [24]...........	..	..	1	..	..
Blackman[25].......	..	..	1	..	..
Rutherford[26]......	..	..	4	..	..
Sudmersen[27]......	..	..	19	..	..
Lavalard[29]........	..	..	810	..	..
Total.........	83	279	1272	40	6

TABLE II.

Cases in which a negative mallein, agglutination, or complement fixation reaction was sustained by clinical, bacteriological, or anatomic evidence.

Reference	Complement Fixation	Agglutination	Mallein Subcutaneously	Ophthalmo Reaction	Cuti-Reaction
de Blieck[2]........	..	..	1	1	..
Wladimiroff[3]......	..	..	16	16	..
Christensen[7]......	..	..	..	76	..
Schlegel[8].........	..	..	23	..	..
Pirl[10]............	..	..	12	..	..
Feist[11]...........	..	..	2	..	..
Preusse[16].........	..	..	32	..	..
Liautard[26]........	..	..	6	..	..
Total.........	..	..	92	93	..

TABLE III.

Cases in which a positive mallein, agglutination and complement fixation reaction was not sustained by clinical, bacteriological, or anatomic evidence.

Reference	Complement Fixation	Agglutination	Mallein Subcutaneously	Ophthalmo Reaction	Cuti-Reaction
Nevermann[4]	..	34	..	..	..
Nevermann[5]	..	25	..	..	..
Nevermann[6]	4	..	..	..	..
Schlegel[8]	..	..	6	..	..
Riemer[9]	..	1	..	..	..
Feist[11]	..	..	1	..	..
" [13]	..	..	22	..	..
Alete[14]	..	..	2	..	..
Preusse[16]	..	..	4	..	..
Sudmersen[27]	..	..	1	..	..
Total	4	60	36	..	..

TABLE IV.

Cases of glanders proved by clinical, bacteriological, or anatomic methods, in which mallein, agglutination, or complement fixation failed to reveal.

Reference	Complement Fixation	Agglutination	Mallein Subcutaneously	Ophthalmo Reaction	Cuti-Reaction
Dietrich[1]	..	..	..	7	13
Riemer[9]	..	2	..	..	..
Preusse[16]	..	..	1	..	..
Valles et Pamisete[8]	..	..	5	..	..
Martel[19]	..	..	..	9	7
Sudmersen[27]	..	..	7	..	..
Lavalard[29]	..	..	2	..	..
Total	..	2	15	16	20

TABLE V.

Positive cases of glanders, tested by mallein, complement fixation, and agglutination.

Test	Total	Correct		Faulty	
		Number	%	Number	%
Complement Fixation	83	83	100	..	..
Agglutination	281	279	99.21	2	.79
Mallein-subcutaneously	1287	1272	98.83	15	1.17
Ophthalmo Reaction	56	40	71.43	16	28.57
Cuti-reaction	26	6	23.07	20	76.93

TABLE VI.

Cases free from glanders and tested by mallein, complement fixation, and agglutination.

Test	Total	Correct		Faulty	
		Number	%	Number	%
Complement Fixation	4	4	100	..	..
Agglutination	60	..	..	60	100
Mallein-subcutaneously	128	92	71.87	36	28.13
Ophthalmo Reaction	93	93	100	..	..
Cuti-reaction	..	..	..	..	..

TABLE VII.

Analysis of positive mallein, complement fixation, and agglutination reactions.

Test	Total	Correct		Faulty	
		Number	%	Number	%
Complement Fixation	87	83	95.40	4	4.60
Agglutination	339	279	82.30	60	17.70
Mallein subcutaneously	1308	1272	97.24	36	2.76
Ophthalmo Reaction	40	40	100	..	..
Cuti-reaction	6	6	100	..	..

Table VIII.

Analysis of negative mallein, complement fixation, and agglutination reactions.

Test	Total	Correct		Faulty	
		Number	%	Number	%
Complement Fixation	..	..	..	..	..
Agglutination	2	..	..	2	100
Mallein subcutaneously	107	92	85.98	15	14.02
Ophthalmo Reaction	109	93	85.32	16	14.68
Cuti-reaction	20	..	..	20	100

TABLE IX.

Statistics presented by Schnurer (30) at the Ninth International Veterinary Congress.

2500 Horses; 190 Autopsies; 102 Glanders; 88 Glanders-free.

Agglutination		Mallein Sub. Q.		Cuti-Reaction	
184 Autopsies	97 Gl. 87 Gl. fr.	64 Autopsies	30 Gl. 34 Gl. fr.	68 Autopsies	36 gl. 32 gl. fr.
		Correct	Results.		
Gl.	82.5%	Gl.	90.0%	Gl.	97.2%
87.5%		86.3%		92.7%	
Gl. fr.	93.1%	Gl. fr.	82.4%	Gl. fr.	87.5%
		Faulty	Results.		
Gl.	17.5%	Gl.	10%	Gl.	2.8%
12.5%		13.7%		7.3%	
Gl. fr.	6.9%	Gl. fr.	17.6%	Gl. fr.	12.5%

Ophthalmo reaction		Endodermal reaction		Fever with local react.		Combined Method.*	
69 Autopsies	37 Gl. 32 Gl. fr.	31 Autopsies	14 Gl. 17 Gl. fr.	34 Autopsies	23 Gl. 11 Gl. fr.	98 Autopsies	52 Gl. 46 Gl. fr.
			Correct	Results.			
Gl. 95.7%	97.3%	G.1 87.1%	92.9%	Gl. 85.2%	100 %	Gl. 93.8%	100 %
Gl. fr.	93.8%	Gl. fr.	82.4%	Gl. fr.	54.5%	Gl. fr.	86.9%
			Faulty	Results.			
Gl. 4.3%	2.7%	Gl. 12.9%	7.1%	Gl. 14.8%	...	Gl. 6.2%	...
Gl. fr.	6.2%	Gl. fr.	17.6%	Gl. fr.	45.5%	Gl. fr.	13.1%

* Combined method: Agglutination plus local reaction or subcutaneous.

From the foregoing tables it will be seen that complement fixation, agglutination, and mallein are the most reliable methods of diagnosis we have. It is the opinion of this committee that rules for judging a bacterial reaction should not be too closely drawn, as many times sanitary authorities have good reasons for making minor changes that would not affect the efficiency of a test.

THE MALLEIN TEST.

The International Veterinary Congress, held at the Hague in 1905, adopted uniform principles for judging a mallein reaction. The following rules which this committee recommends do not differ materially from those adopted by the International Congress, as it seems well to have as much uniformity as possible in mallein testing.

1. From a diagnostic standpoint the mallein reaction can only be considered positive when it produces a typical reaction.

2. A reaction is typical when the temperature rises at least 4° to a temperature of over 104°, and during the first day the fever line should show a plain or two summits, and on the second day, and sometimes even on the third day, a higher elevation is reached. The rise in temperature is accompanied with a local or general reaction.

3. The elevations below 104°, and those without a typical reaction, demand a re-examination.

4. The slow rising to a stationary high temperature proves glanders, even when it otherwise deviates from a typical reaction.

5. The typical local swelling at the place of injection, if accompanied by clinical symptoms, is a positive sign of glanders, even when the rise in temperature, and also the general organic reaction, is absent.

6. All contact animals submitted to the mallein test, whether they give a doubtful reaction or not, should always be tested the second time in from 10 to 30 days.

7. The production of mallein should be carried out exclusively in state or endorsed scientific institutions, or in those under municipal, state, or government supervision.

THE AGGLUTINATION TEST.

The advantages of the agglutination test are that the blood can be drawn by veterinarians unskilled in the use of mallein and sent to a laboratory where the work of testing can be done by experienced men. It can also be employed when the horse's temperature is abnormal, a condition which may prevent the use of mallein, and, further, it is possible to employ it with blood taken from an animal at the time of death. It sometimes happens that the agglutination test gives a positive result when mallein has failed. A few post-mortem examinations of cases of this kind which have come under the observation of members of the committee have revealed lesions of glanders.

The method recommended for making the test, which is practically the same as that proposed by Schutz and Meissner in 1905, is as follows:

1. Procure a pure culture of *Bact. mallei* that will not agglutinate in low dilutions of normal serum and that will agglutinate in glandered serum in dilutions of from 1-500 to 1-1000.

2. Procure the blood from the suspected horse in a clean sterilized bottle. It can be drawn from the jugular vein with a sterile hypodermic needle.

3. As soon as the serum is formed it should be drawn off and diluted 1–40 in a physiological salt solution.

4. In making the test, three c. c. of the test fluid is placed in each of several small test tubes. The diluted serum is added to the test fluid with a small pipette, and thoroughly mixed. In making the different dilutions, the amount of diluted serum to be used is readily ascertained by the following table:

Dilution of serum	Amount of serum diluted	Amount of test fluid	Dilution
1–40	1.2 c. c.	3 c. c.	1–100
1–40	0.6 c. c.	3 c. c.	1–200
1–40	0.405 c. c.	3 c. c.	1–300
1–40	0.3 c. c.	3 c. c.	1–400
1–40	0.24 c. c.	3 c. c.	1–500
1–40	0.195 c. c.	3 c. c.	1–500
1–40	0.15 c. c.	3 c. c.	1–800
1–40	0.12 c. c.	3 c. c.	1–1000
1–40	0.105 c. c.	3 c. c.	1–1200
1–40	0.09 c. c.	3 c. c.	1–1500
1–40	0.06 c. c.	3 c. c.	1–2000
1–40	0.03 c. c.	3 c. c.	1–4000
1–40	0.015 c. c.	3 c. c.	1–8000

The mixture thus prepared is placed in an incubator at 37° C. for from twenty-four to seventy-two hours. A temperature higher than 37° C. interferes with agglutination.

The test fluid is prepared as follows: Acid-glycerine agar cultures of *Bact. mallei* about 72 hours old are used. The growth is washed from the culture into distilled water containing 0.85 per cent. sodium chloride. This suspension is then placed in a thermostat at 60° C. for two hours, which kills the organism; a temperature higher than 65° C. or lower than 60° C. should be avoided. After heating, the suspension is thoroughly triturated and filtered through sterile cotton. The filtrate thus prepared is diluted with the salt solution containing 5% of carbolic acid crystals, until it is of a faintly cloudy appearance. The test fluid gives the best results when made with freshly prepared carbolized-salt solution.

5. The reaction consists of a layer of the agglutinated bacteria, covering the entire concavity at the bottom of the tube. This film-like sediment may become so dense that it rolls in at the periphery. The supernatant fluid becomes clear in the lower dilutions, but in the higher ones the clarification may not be complete, a condition which shows that all the bacteria have not become agglutinated. This is further evidenced by the fact that the layer is less dense in the higher dilutions. The reaction may begin in six hours, but cannot be considered complete until from twenty-four to thirty-six hours have elapsed. In case of no reaction the specimen should be kept for 72 hours before reporting it as negative.

6. Diagnosis. As the serum of normal horses usually agglutinates in dilutions of 1–200 and more rarely in 1–400, it is recommended that a reaction in a dilution of 1–500 should be looked upon as suspicious, and one in a dilution of 1–800 or higher should be considered as evidence of infection with glanders.

7. It is recommended that the macroscopic reaction should be used for diagnosis rather than the microscopic. This is because of the too frequent partial clumping of the organisms as detected by the microscope in dilutions of normal serum. Perhaps with much practice with this method, it would be an aid in diagnosis.

THE STRAUS METHOD OF DIAGNOSIS.

Straus' method of diagnosis can be considered reliable when a positive result is obtained. In case of a negative result it cannot be considered conclusive. There are occasionally atypical lesions in the guinea-pig, and once in a while lesions will not develop when *Bact. mallei* is present. The amount of material to inject is a difficult question to decide. It is advan-

tageous to give as large a dose as possible without killing the guinea-pig with septicemia due to other organisms, as large doses hasten the development of the disease and are more accurate. The size of the dose may be regulated to some extent by staining smears of the suspected material to see how many bacteria are present, paying particular attention as to whether streptococci are present or not; or an agar spread culture may be made which will indicate the number and variety of organisms present. In the meantime the suspected material should be frozen. Freezing for a few days will kill a great variety of organisms, but *Bact. mallei* will withstand 15° to 20° F. for several weeks. In all cases it is advisable to inoculate at least two full-grown male pigs. Inoculations should always be made about ¾ intraperitoneally and ¼ subcutaneously, for otherwise not infrequently the only result will be a subcutaneous glanders abscess at the point of inoculation. The diagnosis should usually be based on the development or non-development of the testicular lesions, which usually appear in from two to seven days from the time of inoculation. Smears and cultures should always be made from the testicular or other lesions.

A positive result is, therefore, based: First, on characteristic testicular lesions; second, on characteristic bacilli in the smear; third, on characteristic bacilli in the cultures made from the testicular or other lesions. It is very seldom that guinea-pigs die within 24 hours from glanders, although such cases have been observed. Pigs dying within 48 hours should always be autopsied, and cultures taken as a general septicemia may be caused by the glanders organism. It is advisable to keep guinea-pigs that do not show lesions at the end of the 7th day for at least one month, in order to rule out any possibility of late development of lesions.

This committee has shown that in 40 cases the average time from inoculation to the development of symptoms was two days, excluding eight delayed cases. Occasionally lesions were encountered such as abscesses of the leg, mesentery, or testicles adherent to the abdomen.

It is advisable to take cultures from the suspected material on suitable culture media, such as potato, as it has been shown by the committee that occasionally the Straus reaction will be negative and the cultures positive.

Table Showing Cases, Dosage, and Result of Cultures.

	Total
Cases positive	301
Receiving 1 and .5 c. c.	283
Receiving .5 and .25 c. c.	18
Streptococci present	20
Swabs positive, pigs positive	21
Swabs positive, pigs negative	11

	Total
Suspicious bacilli present in examination of smears from swabs	77
Followed by positive culture	8
Followed by negative culture	32
Overgrown by mold	36
Showing no growth	1
Swab cultures negative	132
Swab cultures positive	32
Mold	126
No growths	3

The following conclusions are drawn by this committee:

1. That mallein is the most reliable practical method that we have of diagnosing glanders.

2. That the agglutination test is a very valuable aid in diagnosing glanders, and, in some cases, can be employed where conditions prevent the application of other tests.

3. Straus' method is reliable in clinical cases where a positive reaction is obtained in the pig and *Bact. mallei* recovered in pure cultures from the lesions.

4. It is advisable to make cultures in suitable culture media, such as glycerine potato, from the suspected material when Straus' method is employed.

5. Complement fixation is very reliable, but is probably too tedious and complicated for routine procedure.

6. Cuti-reaction and ophthalmo reactions with mallein have shown very poor results.

W. L. Beebe, Chairman.
V. A. Moore,
Harold C. Ernst,
L. Van Es,
B. L. Arms.

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Section on Vital Statistics

OCCUPATIONAL STATISTICS FOR TUBERCULOSIS IN WISCONSIN.*

By L. W. HUTCHCROFT,
Statistician, Wisconsin State Bureau of Vital Statistics.

The subject of occupation in its relation to deaths from various diseases, particularly tuberculosis, has not received the attention which should be given to so important a matter. The most valuable contribution to the subject of occupation, in its relation to deaths from tuberculosis, has been prepared by Frederick L. Hoffman, of the Prudential Life Insurance Company. The investigations made by Mr. Hoffman, and the work done by several of the state departments of health, indicate that there is a very clearly defined causal connection between deaths from tuberculosis and certain occupations.

The so-called dusty trades are generally considered to be especially conducive to the disease. This observation is confirmed by the statistics which I shall present. Of the seven occupations showing high death rates from tuberculosis, six may very properly be classified as dusty trades. These occupations are as follows: glass blowers and glass workers; cabinet makers and upholsterers; plasterers and whitewashers; mill and factory operatives (textiles); cigar makers and tobacco workers, and machinists.

The statistics which I shall use are unreliable in two important particulars, as will be shown later. Only a short time ago, whenever an investigator attempted to make a study of mortality statistics in general, or the deaths from any disease for the whole or any considerable part of the United States, he was compelled to preface his remarks with a statement that the record of deaths is incomplete, and hence the statistical compilations do not reveal the conditions as they exist. I am in a similar position in attempting to treat the subject which has been assigned to me.

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

Through the efforts of Dr. Cressy L. Wilbur, and the co-operation extended by the American Medical Association and the American Public Health Association and similar organizations interested in public health problems, this condition is rapidly disappearing. In addition to the great results accomplished by the accurate registration of deaths, the nomenclature of causes of death has been standardized, thus bringing about a condition of uniformity for the entire registration area. What I shall have to say about the relation of occupation to deaths from tuberculosis will be only secondary to an effort to show the necessity for uniformity and accuracy in the statement of occupational statistics, and to an attempt to show the importance of revising the list of occupations to be considered at certain stated intervals.

At the 1908 meeting of the American Public Health Association, I prepared a paper on "The Mortality from Industrial Diseases," which was read before one of the meetings of this section. At that time I tried to emphasize the importance of obtaining for record the present occupation of the DECEASED and the former occupation, if any, with the duration of each. This was in line with the work being done at that time by Dr. Wilbur, of the Federal Census Office, and I am pleased to state that he has brought about a change in the standard form of death certificate which will make it possible to obtain a complete "occupational history" for every death recorded. This completes the first requirement necessary for a satisfactory study of deaths and death rates for the various occupations.

Before it can be shown what occupations are especially conducive to certain diseases, or in what industries the death rate is abnormal, we must have some means of determining, approximately, the number of individuals employed in each industry or occupation. To accomplish this there must be uniformity of classification and accuracy in the collection of the data by the federal government, and by the states, where a state census is provided for. The death rates from tuberculosis for each occupation, which I shall give later, are based on the federal census reports for 1900, the most accurate statistics obtainable. The Wisconsin State Census, which was taken in 1905, does not provide the same classification of occupations as is used by the federal government, and in cases where the nomenclature is the same, the element of error is so great that the figures are unreliable. I am heartily in favor of adopting a plan which will standardize the nomenclature of occupations, and which will provide for the periodical revision of the classification, so as to include new occupations and industries and discard or combine others as new conditions arise. If such a plan were adopted in taking the Federal Census, and the

registration states were requested to use the same classification when the state census is taken, it would be possible to provide a reliable estimate of the number of persons engaged in each industry for any given period of time. Until this is done our statistics of occupations will be of little value in most states, and the relation of occupation to disease cannot be satisfactorily determined.

The death rate from tuberculosis in Wisconsin during the twenty-seven months from October 1, 1906, to December 31, 1908, based on an estimated population in 1907 of 2,295,000, is 238 per 100,000 population. The death rate by OCCUPATIONS for this period varies from 1,677 per 100,000 population, for glass blowers and glass-workers, to 66 per 100,000, for boatmen and canalmen.

With a given rate for the entire state of 238, the following classes of workers appear to be especially susceptible to tuberculosis; glass-blowers and glass-workers, clock and watch repairers and jewelers; cabinet-makers and upholsterers; plasterers and whitewashers; mill and factory operatives (textiles); cigar-makers and tobacco workers; machinists; journalists; saloon-keepers, etc.; architects, artists, etc.; tinners and tinware makers; plumbers, gas and steam fitters; and musicians and teachers of music.

The highest rate shown, based on the records of 5,484 deaths from tuberculosis, is 1677 per 100,000 for glass-blowers and glass-workers. Next come clock and watch repairers and jewelers with 1567;* cabinet-makers and upholsterers rank third, with a rate of 1353; plasterers and whitewashers have a rate of 1242; mill and factory operatives (textiles) 1070; cigar-makers and tobacco workers 994; machinists 981; journalists 981; saloon-keepers, etc., 925; architects, artists, etc., 931; tinners and tinware makers 907; plumbers, gas and steam fitters 851; musicians and teachers of music 788; barbers and hair-dressers 783; laborers (not agricultural) 748; bookkeepers, clerks, etc., 699; engineers and surveyors 695; compositors, printers and pressmen 666; telegraph and telephone operators 641; leather workers 634; hucksters and peddlers 620; butchers 609; marble and stone cutters 588; gardeners, florists, nurserymen 550; carpenters and joiners 511; painters, glaziers, varnishers 499; commercial travelers 474; nurses and midwives 453; teachers in schools 429; farmers, planters and farm laborers 421; tailors 419; blacksmiths 406; iron and steel workers 402; coopers 390; millers (flour and grist) 338; stenographers, etc., 384; dressmakers and seamstresses 347; bakers and confectioners 321; miners and quarrymen 308; steam railroad employees 304; janitors and sextons 297; hotel and boarding house keepers 286; merchants and dealers 279; clergymen 259; milliners 245; masons (brick

*The statistics given are all expressed in terms of 100,000.

and stone) 243; policemen, etc., 236; lawyers 179; lumbermen and raftsmen 179; engineers and firemen (not locomotive) 176; collectors, agents, etc., 169; draymen, hackmen, teamsters, etc., 168; physicians and surgeons 160; brewers, distillers and rectifiers 129; servants 91; boot and shoe makers 74, and boatmen and canalmen 66.

The death rate for iron and steel workers of 402 per 100,000 is only slightly in excess of the rate for the state as a whole, which is contrary to what might be expected when the nature of the occupation is considered. The rate, however, is based on a population for that industry of 7944 as determined by the Federal Census report of 1900, and I believe it shows more persons engaged in that industry than there were at the time the census was taken, or during the period covered by this investigation.

Another element of error which must be considered is the unsatisfactory statement of the occupation of the deceased, which was often given merely as "laborer" or "factory employee," without stating the nature of the industry where employed. This obstacle in the way of satisfactory occupational statistics will be eliminated in the new form of standard death certificate, if the registration officials in the various states insist upon a complete "occupational history" in all cases.

The very low rate of 74 per 100,000 for boot and shoe makers is due largely to the elimination of handwork and the substitution of machinery. The rate per 100,000 for draymen, hackmen, and teamsters of 168 is subnormal, and is due, I believe, to inaccuracies in the statement of the occupation on the death certificate.

A table showing the percentage of deaths from tuberculosis during the age period from 20 to 29 to the total deaths from that disease for each industry, shows the following interesting facts: For telegraph and telephone operators 100 per cent. of the deaths occurred during the age period from 20 to 29; for boatmen and canalmen 100 per cent; among milliners 85 per cent.; for engineers and surveyors 80 per cent; for architects, artists, etc., 66 per cent.; boot and shoe makers 66 per cent.; sailors, pilots, fishermen and oystermen 61 per cent.; teachers in schools 55 per cent.; nurses and midwives 54 per cent.; bookkeepers, clerks, etc., 53 per cent.; stenographers, etc., 50 per cent.; policemen, etc., 50 per cent.; bakers and confectioners 50 per cent.; plumbers, gas and steam fitters 50 per cent.; servants 48 per cent.; other manufacturing and mechanical industries 44 per cent.; leather makers 44 per cent.; apothecaries, pharmacists, etc., 41 per cent.; clock and watch repairers, jewelers 40 per cent.; compositors, printers and pressmen 40 per cent.; mill and factory operatives (textiles) 40 per cent.; other professional industries 30 per cent.; machinists 39 per cent.; dressmakers and seamstresses, etc., 38 per cent.;

cigar-makers and tobacco workers 38 per cent.; musicians and teachers of music 37 per cent.; brewers, distillers, and rectifiers 33 per cent.; barbers and hair dressers 33 per cent.; journalists 33 per cent.; housewives 32 per cent.; iron and steel workers 31 per cent.; tailors 30 per cent.; clergymen 29 per cent.; laborers (not agricultural) 29 per cent.; hotel and boarding house keepers 28 per cent.; blacksmiths 28 per cent.; collectors, agents, etc., 27 per cent.; no occupation 26 per cent.; cabinet makers and upholsterers 26 per cent.; public entertainment 25 per cent.; students 24 per cent.; draymen, hackmen, and teamsters 23 per cent; farmers, planters and farm laborers 23 per cent.; merchants and dealers 21 per cent.; butchers 21 per cent.; painters, glaziers and varnishers 21 per cent.; tinners and tinware makers 21 per cent.; carpenters and joiners 21 per cent.; glass blowers and glass workers 20 per cent.; other mercantile and trading industries 17 per cent.; gardeners, florists, nurserymen and vine growers 16 per cent.; stock raisers, herders and drovers 16 per cent.; other agriculture, transportation and other outdoor industries 16 per cent.; marble and stone cutters 16 per cent.; millers (flour and grist) 16 per cent.; masons (brick and stone) 15 per cent.; commercial travelers 15 per cent.; hucksters and peddlers 14 per cent.; personal service 11 per cent.; saloon-keepers, etc., 10 per cent.; engineers and firemen (not locomotive) 10 per cent.; and miners and quarrymen 10 per cent.

After carefully analyzing the tables which I have prepared to obtain the facts for this discussion, I am inclined to believe that the influence of dust in industry and also the effect of out-of-door, as compared with indoor occupations, have been emphasized at the expense of other factors which should receive careful consideration. Practically all occupations which necessitate hard labor which lowers the resisting power of the body have a high rate from tuberculosis.

In conclusion, I am forced to state that the complex problem defining the relationship of occupation to tuberculosis cannot be satisfactorily solved for the reasons mentioned, and the most that I can hope to accomplish is to point out by means of a concrete demonstration the necessity for uniformity and accuracy in the collection of occupational statistics

Section of Municipal Health Officers

GARBAGE RECEPTACLES.*

By P. M. HALL, M. D.
Commissioner of Health, Minneapolis, Minn.

Garbage collection and garbage disposal have been discussed in a general way so many times that it would seem that the last word had been said. Instead of handling this great subject in a general way now, probably more can be learned by taking up some phase of the subject in greater detail. I shall, therefore, confine this paper to the discussion of the "garbage receptacle" alone.

As a text for this discussion, let us quote the description of the "garbage receptacle" as found in a well-known book on sanitation: "The garbage receptacle, especially when separation of true garbage is made, is usually one of the commonest forms of nuisance to be found. Every garbage can, unless it is emptied daily and thoroughly washed after emptying (which is practically never done), is sure to be offensive in hot weather. The annoyance from it can probably never be entirely done away with, and it is only with great care and at some expense that it can be reduced to a minimum."

When we consider that practically all municipalities collect and dispose of garbage separately from other forms of refuse, we have exactly the condition as defined—a separation of true garbage. As a basis for this paper, letters of inquiry were sent to all cities of 100,000 population and over in the United States and Canada. Replies were received from practically all of them. In the majority of cities it is specified by ordinance or rule that the garbage receptacle shall be water-tight; shall be covered; shall have handles on the side of the can or on the cover; the size is designated from two gallons to two bushels; the materials from which the receptacle is to be made are specified. It is also provided that the receptacle shall be kept in a place remote from dwellings, or placed on walks when the hours of collection are known; that the collector shall neither go up-stairs nor down cellar for it, but that the can must be placed on the ground floor.

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

A very little analysis will show that the sanitary condition of the garbage can has been the principal factor in determining the cost of the collection of garbage. It may be set down as an axiom in the collection of garbage that the cost of collection increases with the frequency of service. The ability of a man and team to collect is not measured by the amount which he collects, but by the number of stops, the distance of travel, and the number of cans he is obliged to handle; so that a daily collection would necessarily cost more than a collection every other day, and a collection twice a week more than a weekly collection. The demand for frequent collection has arisen from, and because of, the sanitary condition of the garbage receptacle. Furthermore, undoubtedly, the sanitary condition of the garbage receptacle has had everything to do with making the mere mention of the word "garbage" an offense. Immediately comes to our minds that same noisome garbage can.

In the rules or ordinances of cities, garbage is almost universally described as the animal and vegetable waste from the kitchen, or as resulting from, or growing out of, the preparation of food. Garbage is subject to rapid decay, a decay which is hastened by three things—heat, moisture and flies; and yet, what we call garbage is but an hour removed from our tables—has been served to us as food.

The first step in the disposal of garbage is to carry it from the house and place it in the can, and the question naturally arises, why should not this step be a sanitary one, and be made in the direction of educating the householder? Under conditions existing in almost every city, the can is as great a nuisance, if not a greater one, than the garbage itself. In primitive days, the Indian, when the offense from the waste products of his housekeeping became too noisome, moved away; but in our day and generation, we remove the garbage and keep the smell. Take the first step, that of placing the garbage, the waste food or droppings from our tables, into any kind of receptacle—wood, galvanized iron, or what-not—and with the presence of heat, moisture, and flies, there will very soon be a foul, maggoty, fly-breeding mess of putrefaction. Such a mess is necessarily a nuisance, requires frequent removal, and is a nuisance every time it is handled from the can to its final disposal. Is it necessary that this condition of things should be? Is there no way to eliminate these aids to putrefaction—heat, moisture, and the fly? Is it not a little bit inconsistent that we legislate and talk about fly-infection, when we are perpetuating the fly-nuisance in the garbage can by furnishing a most prolific breeding place? It has been said that the annoyance of the can probably never will be done away with. It seems that this condition of things

has been accepted everywhere, and that nobody has tried to solve the problem. We find, however, exceptions in two cities—one in the United States and the other in Canada—where an effort, at least, has been made to keep the garbage can from being a constant nuisance. How these two cities have been trying, with a great measure of success, to make the garbage can no longer a nuisance, is the subject of this paper.

"Drain garbage of all moisture, then wrap it in paper before putting it in the can, and it will neither smell bad in hot weather, nor freeze and stick to the can in cold weather. Do this and have a clean can at all times."

Heat, moisture and the fly are all eliminated by the foregoing method. This rule was put into practice in Minneapolis in February, 1907, and is still in force. The campaign of education was a hard one, but we have won. As one of the garbage collectors recently said to me: "The garbage cans in my district are clean enough to keep pies in." A recent clipping from one of the Minneapolis papers bears most pertinently on this point:

"BRIGHTENING THE LIFE OF THE GARBAGE MAN."

"While speaking along this line of housework, did you ever notice that the conscientious housekeeper is known by her garbage can? The gentleman who collects the garbage does not do it for pleasure, nor for his health, nor to help the community to live a sweeter, saner life. Harsh necessity rules his business, as it does yours.

"Now the garbage collecting business differs from the florist business in divers ways. But it can be made much more simple and enjoyable by the housekeeper who will take a little thought for others. No garbage collector ever makes the rounds without here and there coming upon a collection which causes tears to course their grimy way down his weather-beaten cheek. This is because there lives at that place where he does his weeping a careful and thoughtful housewife. Every time she takes any garbage out, she wraps it carefully in old newspaper or wrapping paper and ties it in a neat bundle. The result of this simple act is that the garbage collector raises his hand to heaven and blesses the place, and life for all concerned is sweeter and richer for this simple act of thoughtfulness."

It all rests with the collector. He has but to report to the department that the garbage is not properly drained and wrapped in paper, and no further service is rendered until the rule is complied with. If the householder fails to care for his garbage properly, or to have it cleaned up, he is brought into court and fined.

The operation of this rule has its economic, as well as its sanitary side. The life of the can is very much prolonged. The garbage will roll out of the can in cold weather as well as in the summer; if it does not, and the garbage is frozen, the can is not emptied, for the householder has failed to drain off the moisture. The collector is forbidden to carry or use a

pick or crowbar to dig our frozen garbage, so the can is not battered up. Garbage kept in this way is not a nuisance, does not invite flies, and needs to be collected but once a week, even in warm weather, all of which makes a great saving in the cost of collection. It follows naturally that garbage which is not foul in the can will not be so in the wagon or cart. The garbage can should be kept water-tight; when it is not so, it should be discarded and a new one provided. A great deal of trouble has arisen from the tipping over of the cans by dogs. A recent invention in the shape of a small appliance on the cover makes the cover self-locking, and the dog nuisance a thing of the past.

The size of the can depends so much on the frequency of collection that it need hardly be discussed here. We have found that a 20-gallon can will take care of the garbage of an average sized family for a week, and is easily handled by the collector. It is not necessary, even in a cold climate, to have different receptacles in the winter time, for if the rule regarding drainage of moisture and wrapping with paper is followed, a metal can is just as easily emptied and kept clean in the winter months as a wooden one.

The question of location of the can is determined largely by the method of collection. In general terms, it may be said that cans should be placed where they are most accessible to the driver.

The results of over three years' experience with this method of handling garbage in our city have been entirely satisfactory. At first the plan was laughed at as a fad of the department. We were asked when we would also require that the packages be tied with baby ribbon; but we persisted, and now the public is in accord with us, for they have seen actual results in the shape of clean, sanitary cans which are no longer a nuisance. Is it not a pertinent question that in the collection and disposal of garbage the first step should be a system of collection that gives to the citizen a garbage can which is no longer a nuisance?

Notes and Reviews*

EPIDEMIOLOGY AND PREVENTIVE THERAPEUTICS.

C. V. CHAPIN, M. D.
Providence, R. I.
(*Reviewer.*)

A Health Officer's Study of Tuberculosis. The reports of Matthew Hay, the Medical Officer of Health of Aberdeen, always contain interesting original material. That for 1909 is no exception. It contains a detailed study of tuberculosis. Hay calls attention to the fact which has been noted elsewhere that the decline in this disease began long before its infectious nature had been demonstrated by Koch; and he shows what also has been noted elsewhere, that the rate of decline was almost as great before any administrative attention was being paid to it as it has been after such attention began. He attributes the decline chiefly to improvement in general hygienic conditions. He refers to Newsholme's views that the increasing segregation of consumptives in institutions is an important factor in the decline, but he does not think that the figures in Aberdeen, so far as obtainable, support this view. The experience of Providence, as indeed that of other American cities, corresponds to that of Aberdeen, but Newsholme thinks that the rapid changes of population in American cities render their experience on this point of little value. Of 300 deceased cases in Aberdeen, investigated as to whether the patient had been informed of the nature of the disease before death, it was found that in about 50 per cent the attending physician had not told the patient of the diagnosis and, of course, could not have given definite instructions as to the restriction of infection. Perhaps this neglect on the part of the medical attendant, which, it is to be feared, is as common in many American cities as it is in Aberdeen, may be one reason why the "administrative control of tuberculosis" has been productive of so little results.

Although the figures are not large, a study of infantile tuberculosis does not indicate any close connection with the consumption of cow's milk, but it does indicate a close relationship with tuberculosis in the family.

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

Dr. Hay gives charts for tuberculosis, whooping cough, and measles, showing the distribution of deaths among children under 3 months, 6 months, 12 months, and for each year up to the fifth year. The similarity between these charts is suggested as an indication that the excessive mortality from these diseases in very early life is due, not to exceptional exposure to infection, but to an inherent inability to withstand the disease, owing to the physical characteristics of that period of life.

There are apparently no "lung blocks" in Aberdeen, for the health officer has failed to meet with "any well marked example of the so-called tuberculous house, or the house that seems to remain infected after some earlier case of phthisis, and to continue to infect a series or a succession of tenants. There have been a few cases—amounting to 4 or 5 per cent. of the cases of phthisis investigated—in which there was a suspicion or even a certainty that a member of the immediately preceding tenant's family had suffered from tuberculosis; but the disease is so wide spread that one must allow for a considerable percentage of accidental coincidences." It is also shown that, as has been the experience in other cities, the removals of tuberculous families from house to house are quite frequent, and in Aberdeen in about three-fifths of these removals no attempt is made by the occupants to disinfect the house before removal, and although disinfection is practiced by the health department after the death of a patient, it is rarely done after removal. Yet these alleged infected houses apparently fail to infect.

Dr. Hay adds his quota to our knowledge concerning marital tuberculosis. He finds that in 7 out of 121 husbands dead of tuberculosis, their death had been preceded by the death or illness of their wives from phthisis, and of 88 wives that died of tuberculosis in only 2 instances was the death preceded by the death of a phthisical husband. Allowing for the ages of the parties, and the duration of married life, the number of husbands infected from their wives was two or three times more than the number derived from a calculation of the probabilities, and the number of wives infected from their husbands was about equal to the probabilities. In 6 of the 9 cases of possible marital infection there was a tuberculosis history in the family of the person infected.

Management of Ringworm. The report of the Chief Medical Officer of the Board of Education (George Newman, M. D.) contains much information concerning methods of school inspection in England, and is worth perusal by all Americans interested in that subject. The question of controlling ringworm is dealt with at some length, and the action of various health authorities is referred to. Many of these consider that ringworm is only slightly contagious, and that it tends to die out even when left to

itself. Priestly found ringworm in 71 out of 370 schools in Staffordshire. That it did not tend to spread is shown by the distribution of the cases in the schools, which was as follows: 1 had 5 cases of ringworm; 2 had 4 cases each; 4 had 3 cases each; 11 had 2 cases each; 53 had 1 case each.

On the other hand, Dr. Moffatt,* assistant school medical officer for Bolton, mentions that 84 cases of ringworm were met with last year, and of these 40 occurred in a sharp outbreak at one school.

An investigation during the following year showed that for every school where ringworm managed to persist into the second year there were two or three where it died out. Priestly, as well as others, thinks that children with ringworm may be permitted to attend school under the following conditions:

1. The hair to be cut short.
2. The case to be under daily treatment.
3. The child to wear a linen skull cap. The cap should belong to the school, and must be exchanged for a clean one when the child arrives in the morning, but the child must go home in it and return in it the next day. It must be worn continuously in and out of doors, as far as the teacher can control this. The discarded cap must be boiled.

The English find that the drug treatment is not usually very successful, especially when applied by the family physician, and it has been shown that a very high percentage of those reported cured by their physician are still infected. The X-ray treatment is steadily superceding other forms, and has been extensively employed by the education authorities in London, Croydon, Finchley, Salford, Bradford, and other places. Excellent results are reported.

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* The Medical Officer, 1910–1911, V. 288.

DATA FROM WATER PURIFICATION WORKS—April, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins.						Parts per 1,000,000						Nos. of Bacteria per Cu. Centimeter		No. of Deaths from		
						Settling Basin			Coagulation Basin			Unpurified Water			Purified Water							
						Period in Hours	Effluent		Period in Hours	Effluent												
							Turbidity	Bacteria per c. c.		Turbidity	Bacteria per c. c.	Turbidity	Color	Total Hardness	Turbidity	Color	Total Hardness	Unpurified Water	Purified Water	All Causes	Typhoid Fever	Pulmonary Consumption
Albany, N. Y.	100,700	Hudson River.	16 rapid sand, 8 slow sand Filters and Disinfection.	20.8	2.3	18.5	65	66,600	Combined with the sedimentation.			85	29	78	0	17	78	77,400	28	172	1	25
Cincinnati, O.	364,463	Ohio River	Rapid sand filters using lime and iron as a coagulant.	43.3	3.1	48.	57	1,800	11	16	500	160	...	55	0	...	67	7,000	55	¶ 523	1¶	¶ 92
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	13.5	0.8	18.	6	27	Combined with the sedimentation.			117	34	215	0	7	75	12,400	* 90	170	1	22
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	7.9	1.7	6.	...	....	1.5 ‡	....	69	38	8	34	0	0	38	28,700	7	81	0	9
McKeesport, Pa.	42,694	Yoghiogheny R.	Water softening and mechanical filtration.	3.5	0 3	20.	0	30	Combined with the sedimentation.			...	0	77	0	0	61	9,300	14	56	1	2
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using lime and iron as a coagulant.	13.2	0.5	4.	450	3,000	24	25	180	500	11	91	0	4	57	3,600	29	618	2	71
Toledo, O.	180,000	Maumee River	Mechanical filtration.	14.5	3.2	7.	8	440	Combined with the sedimentation.			464	30	...	0	10	...	48,000	* 130	201	2	...
Washington, D.C.	348,460	Potomac River	Sedimentation with slow sand filters.	55.8	0 5	96.	16	348	* ..	..	..	41	0	45	0	0	45	2,300	13	551	3	64
Youngstown, O.	80,000	Mahoning River	Mechanical Filtration, using Sulphate of Alumina.	8.0	4.0	3.	20	3,000	Combined with the sedimentation.			71	30	53	0	0	64	28,400	171	** ...	** ...	** ...

NOTE :—¶Statistics of Health Department made out by weeks not months at Cincinnati.—Data given cover period of week ending April 8th, through April 29th.

*High numbers of bacteria noted in the filtered water at Toledo and Columbus were caused by the development of "after growths" of bacteria in the City Mains following the application of "bleaching" powder. These growths were formed by organisms which are non pathogenic and disappear within a few days if the treatment with Bleach is discontinued. This fact suggests that not more than 0.3 p.p.m. of "Available chlorine" should be added.

‡Coagulant was applied to water entering sedimentation at Harrisburgh on 13 days in April.

W. R. Copeland, Columbus, Ohio, Reviewer.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Mass.
(*Reviewer.*)

The New York Milk Committee, a voluntary organization working in the interests of improving the milk supply of New York City, at a Convention held under their auspices on December 2 and 3, 1910, as a result of resolutions passed by the numerous experts who attended that convention, decided to appoint a Commission on Milk Standards. It was thought desirable that such a Commission should be representative, and yet not large. The chief reason for its appointment was the lack of uniformity existing throughout the country, particularly with reference to the standards for the bacteriological character of milk. The Committee considered a large number of names, especially those who were familiar with the examination of milk for bacteria, and from the list asked the following gentlemen to serve as members of the Commission.

Dr. W. A. Evans, Chicago, Ill.	Prof. H. C. Sherman, Columbia Univ.
Dr. Wm. H. Park, New York City.	Dr. A. H. Stewart, Philadelphia, Pa.
Professor M. J. Rosenau, Harvard Univ.	Dr. W. R. Stokes, Baltimore, Md.
Professor H. W. Conn, Middletown, Conn.	Dr. B. L. Arms, Boston, Mass.
Dr. John A. Anderson, Washington, D. C.	Mr. Chester H. Wells, Montclair, N. J.
Dr. A. D. Melvin, Washington, D. C.	Dr. M. P. Ravenel, Madison, Wis.
Dr. E. C. Levy, Richmond, Va.	Dr. G. W. Goler, Rochester, N. Y.
Professor W. A. Stocking, Cornell Univ.	Mr. Raymond A. Pearson, Albany, N. Y.
Dr. L. L. VanSlyck, Geneva, N. Y.	Dr. Chas. E. North, New York City.

This Commission held its first meeting on May 22nd, 1911, at the Academy of Medicine, New York City, which was kindly placed at their disposal. Dr. Evans was elected Chairman, and Dr. North, Secretary. All expenses of the Commission are paid by the New York Milk Commission.

The Commission informally resolved at the outset that its work would necessarily cover several months at least of time, and that therefore, it would be unwise to reach any final conclusions at its first session. In order to obtain some idea of the feeling of the members upon the several subjects which had been prepared for discussion, certain resolutions were brought up and passed, with the understanding, however, that such action was not final, and that these resolutions might be revoked at future meetings of the Commission.

The matters passed upon in this way were the following:

1. That the interests of public health demand that the control of milk supplies shall include regular laboratory examinations of milk by bacteriological methods.

2. That among present available routine laboratory methods for determining the sanitary quality of milk, the bacterial count occupies first place.

3. That bacteriological standards should be a factor in classifying or grading milks of different degrees of excellence.

4. That bacteriological examinations of milk are of importance at every stage of production and distribution, but in the establishment of grades and classes of raw milk, such grades and classes should be based on the bacterial content of milk as offered for sale.

5. That small cities and villages should have the same classifications for milk as large cities.

6. That there should be bacteriological standards for the control of milk distribution for the milk before it is pasteurized, and for the milk after it is pasteurized.

7. That chemical standards for milk delivered to cities and towns should be not less than 3¼% butter fat, and 8¼% solids other than fat.

8. That milk should be divided into several classes, as follows:

Class A—Certified milk, or milk which is produced in conformity with the requirements of certified milk.

Class B—Inspected milk, or milk produced under careful conditions so far as cleanliness or infectious diseases is concerned; to contain while raw not over 60,000 bacteria per cubic centimeter on the average; to come from farms scoring not under 60% on the Government score card; to be obtained from cows which are given a physical examination and tested with tuberculin at least twice a year; to be placed only in sterilized containers, and in general to be fresh and clean; pasteurization of this milk from tuberculin tested cattle is optional, otherwise compulsory.

Class C.—Market Milk. Market milk comprises all whole milk legally permitted for sale, not in Classes A, B or D. Pasteurization of this milk is compulsory.

Class D.—Milk for cooking purposes. Milk containing over one million bacteria per cubic centimeter, or from farms scoring less than 40% on the Government score card, or older than three days, shall be pasteurized and labeled "for cooking purposes only."

Class E.—Pasteurized milk. Pasteurized milk is milk heated to not less than 60° C. or 140° F. for not less than 20 minutes or its equivalent; nor higher than 70° C. or 158° F. for not less than five minutes, and rapidly chilled. It must be placed in sterilized containers, and handled so as to prevent reinfection. Pasteurized milk shall be labeled with the date on which heating was done.

Class F.—Heated Milk. If heated to a higher degree, the milk should be labeled "heated milk," the temperature and the date of heating being shown on the label. Pasteurized and heated milk shall be under official surveillance.

Class G.—Skim Milk. Skim Milk shall contain not less than 8½% solids not fat, and not more than 1% fat, to be labeled "Skim Milk."

9. That the bacterial count of milk indicates its quality and history either as modified by initial contamination, improper handling, dirt, or improper refrigeration. A high count indicates the necessity of investigation and inspection in order that remedies may be applied.

10. That there be adopted as standards for making the bacterial count, the "Standard Methods for the Bacterial Examination of Milk," of the American Public Health Association, Laboratory Section; recommending, however, the incubation of plate cultures at 37° C. for 48 hours.

11. That the examination of milk for the bacteria of tuberculosis, either by microscopic examination, or by the inoculation of animals, cannot be considered definite. That, therefore, milk containing the tubercle bacillus be excluded from the market by means of the tuberculin testing of cattle or by the proper pasteurization of milk.

Several other subjects were discussed and referred to special committees.

The following committees were appointed:

Executive Committee—Dr. Evans, Dr. Rosenau, Mr. Pearson, Mr. Wells, Dr. North.

Committee on Grades and Classes of Milk—Dr. Melvin, Dr. Park, Dr. Anderson.

Committee on Bacteriological Standards.—Dr. Rosenau, Dr. Park, Professor Conn.

Committee on Chemical Standards.—Dr. Van Slyck, Dr. Sherman, Mr. Pearson.

Committee on Standard Ordinances and Laws Controlling Milk.—Dr. Arms, Mr. Wells, Dr. Stewart.

Committee to Consider Licensing of Dealers in Baby Milk—Dr. Evans, Dr. Levy, Dr. Stokes.

Committee on New Questions—Dr. North, Dr. Ravenel, Dr. Goler.

It was decided that the special committees appointed should carry on their work during the coming summer, and that the Commission should hold another meeting some time during the month of October.

It was thought possible that the Commission could bring its deliberations to a conclusion at the October meeting.

The Committee on New Questions was instructed to correspond with all the health officers of this country, with a view to ascertaining just what particular questions connected with the control of milk supplies seemed to them the most important, and to use this information as the basis for suggestions to be made at the next meeting.

The Secretary, Dr. Charles E. North, 30 Church Street, New York City, would greatly appreciate it if health officers and others interested would send in comments or suggestions concerning milk standards and the control of milk supplies for the consideration of this Commission at its next meeting.

The Healthologist.—The Official Bulletin of the Health Department of Milwaukee appears this month (June) under a new title, "The Healthologist." It is filled with timely material presented in a convincing manner.

"Anti-Vaccination Hospital,"—a New Name for a Pest House.*—"Few places have more repulsion for people than the so-called 'pest house.' Entire communities rebel against having such institutions in their midst. Vandals go so far as to burn them, as it is believed they did in Key West, and attempted to do in Tampa.

"Now it may be that there is something in a name. Perhaps 'Anti-vaccination Hospital' would be less repulsive, especially to those in whose honor the name is proposed. And since it is the anti-vaccinationists that make up the clientele of these smallpox institutions, the name 'Anti-vaccination Hospital' would certainly be appropriate.

"And who knows but that in time, under the protecting wing of the 'antis,' and with their liberal patronage, and wearing a new and dignified name, the old-time pest house might at length become a respectable institution that communities would fight for, even as they do for penitentiaries. And it would have the advantage that any community could have one as soon as it had 'antis' enough to support it."

* Florida Health Notes, June, 1911.

Changes in Personnel in Florida State Board of Health.*—"On April 17, 1911, Dr. Jos. Halton, of Sarasota, was appointed agent of the State Board of Health for Manatee County, vice Dr. H. Baer, of Bradentown, who had removed from that county.

"On May 5, Dr. F. F. Ferris, of Apalachicola, was appointed agent of the State Board of Health for Franklin County. This addition to the Board's representation in Franklin County was necessitated by the prevalence of smallpox at Apalachicola, and because the duties of Dr. B. B. Blount, who has been our agent for many years but lives at Carrabella, prevented him from giving the attention to sanitary affairs at Apalachicola that the present exigency demanded. Dr. Ferris has established regular office hours for vaccination, at which time the citizens are presenting themselves to receive this protection, free of charge.

"On May 17th, Dr. W. Kilmer, of Orlando, resigned as the Orange County Agent for the Board, and on the same day, Dr. T. M. Edwards, of Green Cove Springs, who is removing from the state, resigned his position as agent for Clay County. New appointments for these two counties will probably be announced in the July issue of the Notes."

An Act to Prohibit the Use of Suction Shuttles in Factories in Massachusetts.†

"SECTION 1. It shall be unlawful for any proprietor of a factory or any officer or agent or other person to require or permit the use of suction shuttles, or any form of shuttles, in the use of which any part of the shuttle or any thread is put in the mouth or touched by the lips of the operator. It shall be the duty of the State Board of Health to enforce the provisions of this act.

SEC. 2. Violations of this act shall be punished by a fine of not less than fifty dollars for each offense.

SEC. 3. This act shall take effect on the first Monday of May in the year nineteen hundred and twelve; but if the proprietor or manager of a factory shall, in good faith, show to the State Board of Health sufficient reasons for its inability to comply with the provisions hereof at the time when this act is to take effect, the said board may, in its discretion, grant a reasonable extension of time within which the said factory shall comply with the provisions hereof. (Approved April 13, 1911.)"

The Sanitary Control of Venereal Diseases.‡—"One of the significant features of the present world-wide movement for the conservation of health and vitality is the slow yet steady change which is taking place in the attitude of thinking men and women toward the venereal diseases. It may be truly said that we are standing upon the threshold of a new era in the status of these maladies. Very few years ago no magazine intended

* Florida Health Notes, June, 1911.
† Monthly Bulletin, Massachusetts State Board of Health, April, 1911, Chapter 281, Acts of 1911.
‡ The Monthly Bulletin of the Department of Health of the City of New York.

for lay readers, and certainly no newspaper, would go so far as to print the words gonorrhea or syphilis, and articles dealing with these infections were rigidly excluded. Today, venereal diseases and their consequences are openly and fearlessly discussed, not only in certain magazines of the progressive type, but in clubrooms and from the lecture platform, by men and women who are imbued with the need of a wide extension, for the benefit of humanity at large, of the knowledge of these diseases. In a number of cities in this country, special societies composed of physicians and laymen have taken up propaganda for the education of the people, especially the younger generation, in the nature and dangers of venereal diseases, and recently these societies have become federated into a general body, giving the movement a national character.

"There has been for some time, among students of the social diseases, a growing conviction that these affections should be dealt with very much in the same manner as other preventable maladies, such as tuberculosis, for example. The contention that the venereal diseases are shameful and secret, and therefore should not be regarded in the same class as other communicable diseases, is sufficiently answered by the well recognized fact that these maladies are very frequently innocently acquired, and that the most pathetic consequence of their prevalence is the suffering and death of many wives and children who are helpless victims of marital and parental transmission. In the words of Bouchard 'the shame of these diseases is only for society which does not know how to deliver itself from their plague; which allows itself to be decimated by them'."

Smallpox and Vaccination in the Philippine Islands.*—During December, 1910, a person afflicted with smallpox was transferred from San Jose, Antique, to the Island of Caluya, which is a small isolated island south of Mindora, the inhabitants of which have heretofore not been systematically vaccinated. An old woman took some of the contents of a pustule from the smallpox case shortly before death, and commenced to vaccinate a number of the inhabitants. Smallpox in epidemic form soon resulted. The population of Caluya and near-by islands is about 2,000. Approximately 1,000 cases of smallpox occurred before the facts became known to the outer world. Vaccinators, properly equipped, were immediately sent to Caluya. They vaccinated 800 of the remaining thousand persons. Of these not one contracted smallpox who had a successful vaccination that was two weeks old. The chief quarantine officer visited ten families, ranging from 5 to 8 in number. In 6 of these every member was stricken with smallpox. A physical examination showed that they had no vacci-

* Victor C. Heiser, U. S. P. H. & M. H. S. Reports, June 9 and 11, 1911.

nation marks. In two other families 6 persons were stricken and 2 escaped infection. A physical examination showed that of the 6 stricken members not one had been vaccinated. The 2 remaining members had successful vaccination marks. Upon inquiry, it was learned that they had visited Calapan a year previously and were vaccinated while there. In two other families living in the midst of a smallpox stricken village there were no cases of smallpox. A physical examination showed that they had good vaccination scars. Further inquiry elicited a statement that they had but recently come from another island where they had been vaccinated. In one house one person was found with varioloid. Upon inquiry, it was learned that he had not been vaccinated during childhood.

"Net Result: Community of 2,000 population; 1,000 unvaccinated persons contract smallpox, 400 die; 800 are protected by vaccination, no cases occur after the incubation period was passed, and no deaths occurred. The remaining 200 are semi-civilized and fled from the vaccinators, and their condition is unknown."

Measles Successfully Transferred to Monkey.* Drs. Anderson and Goldberger report successful results from inoculating blood from patients suffering from measles into rhesus monkeys, in one instance carrying the infection through three monkeys, producing a reaction-elevated temperature and an eruption.

License to Practice Medicine May Be Revoked If a Physician Fails to Promptly Report Births and Deaths.† "Attorney-General Carmody, in an opinion rendered to the State Commissioner of Health, forcibly defines the powers and duties of local Boards of Health and the State Department of Health in enforcing the provisions of Section 22 of the Public Health Laws requiring prompt and complete reports of all births to be filed with the Department each month.

"Mr. Carmody says in part:

"'The method of registration of births by the local boards of health is prescribed by the State Department of Health and should be followed by such local boards. I fail to conceive that the prosecution of a physician for a violation of law is more serious than that of a person of any other profession or occupation. Because of the many privileges accorded him by law, and his prominent place in society, a duly licensed and registered physician should be one of the first in the community to realize the public benefits secured by compliance with the Public Health Law, and he should be one of the first to assist in its enforcement. The authorities in any municipality should not, through fear, hesitate to enforce the law. Where the authorities of municipalities neglect or refuse to perform the duties of their office they may be removed.

* Public Health Reports, June 9 and June 16, 1911.
† Monthly Bulletin New York State Department of Health, May, 1911.

The State of New York will not tolerate its system of vital statistics to be impaired by the failure of the authorities of a municipality to perform the duties they have sworn to perform.

"'After a careful consideration of the matter requested, I arrive at the conclusion that where a local board of health neglects or refuses to make and enforce the ordinances as provided by the Public Health Law, the State Department of Health may mandamus such board under the authority given by section 37 of the Public Health Law; or, after notice to the local board of health is given of registration defects, the State Department may, under the provisions of section 5 of the Public Health Law, take control in any municipality of the registration and record thereof, enforcing the rules and regulations in regard thereto, securing complete registration, and continue such control until the Commissioner of Health is satisfied that the local board of health will make the proper registry and record required by law, and that the expenses of such control shall be a charge upon the municipality. Also, that persons violating lawful local health ordinances may be prosecuted under such ordinances and under the provisions of Section 1740 of the Penal Code, and where a physician is found guilty of violating the Public Health Law, or section 1740 of the Penal Code, he may be proceeded against under the provisions contained in section 170 of the Public Health Law for the annulment of his registration and the revocation of his license to practice medicine in this State'"

"The Commissioner of Health of New York regards the decision of the Attorney General as a very important and able document. The responsibilities resting upon local boards of health are clearly outlined, and it is the intention of the department to see, so far as it lies in its power, that their duties are carried out. It is extremely important that the registration of vital statistics should be improved, particularly in those places which have been negligent in the past, and the Commissioner will take active steps to that end where the local boards of health fail to do so."

Personals. Dr. Hibbert Winslow Hill, Director of the Division of Epidemiology of the Minnesota State Board of Health, received the Diploma of Public Health (by examination) of the University of Toronto at the recent commencement, Friday, June 9th, 1911. Dr. Hill graduated from Toronto University in 1893, with honors and a post graduate scholarship, receiving the degree of M. B., which is the only degree granted by Toronto University on graduation in medicine. In 1899 he received the M. D. degree, together with the Starr gold medal, awarded for a thesis on "Relation of Bacteriology to Public Health." The Diploma of Public Health, just granted, is the first given by the University of Toronto, although the course has been open and the degree available for several years.

BOOK REVIEWS.

Education and Preventive Medicine. Norman Edward Ditman, Ph. D., M. D. The Columbia University Press, N. Y. Paper, 25 cents.

This is an extremely interesting paper of seventy-three pages, which covers the field of preventable diseases briefly, but forcefully, showing by both text and charts (24) the great need of training health officers in all branches of sanitation, and also of educating the public to understand that they, also, have an important part to play.

Comparisons are made between the far reaching epidemics of the earlier centuries and the present day as in the case of smallpox.

The great gain in human life, due to the knowledge of the mode of transmission of yellow fever, is shown, closing with the quotation from General Leonard Wood's tribute at the memorial service to Major Read: "I know of no man who has done so much for humanity as Major Reed. His discovery results in the saving of more lives annually than were lost in the Cuban War and saves the commercial interests of the world a greater financial loss each year than the cost of the entire Cuban War."

Plague, cholera, syphilis, gonorrhea, tuberculosis, diphtheria, beri beri, rabies, pneumonia, and typhoid are discussed. Alcoholism and its relation to health and society has nearly four pages devoted to it. Cancer, heart disease, diabetes and Bright's disease are taken up with a plea for research into causation and diminution. Infant mortality and preventable accidents also receive attention.

This excellent paper should have a very wide circulation as its power for good is great.

B. L. A.

CLIPPINGS.

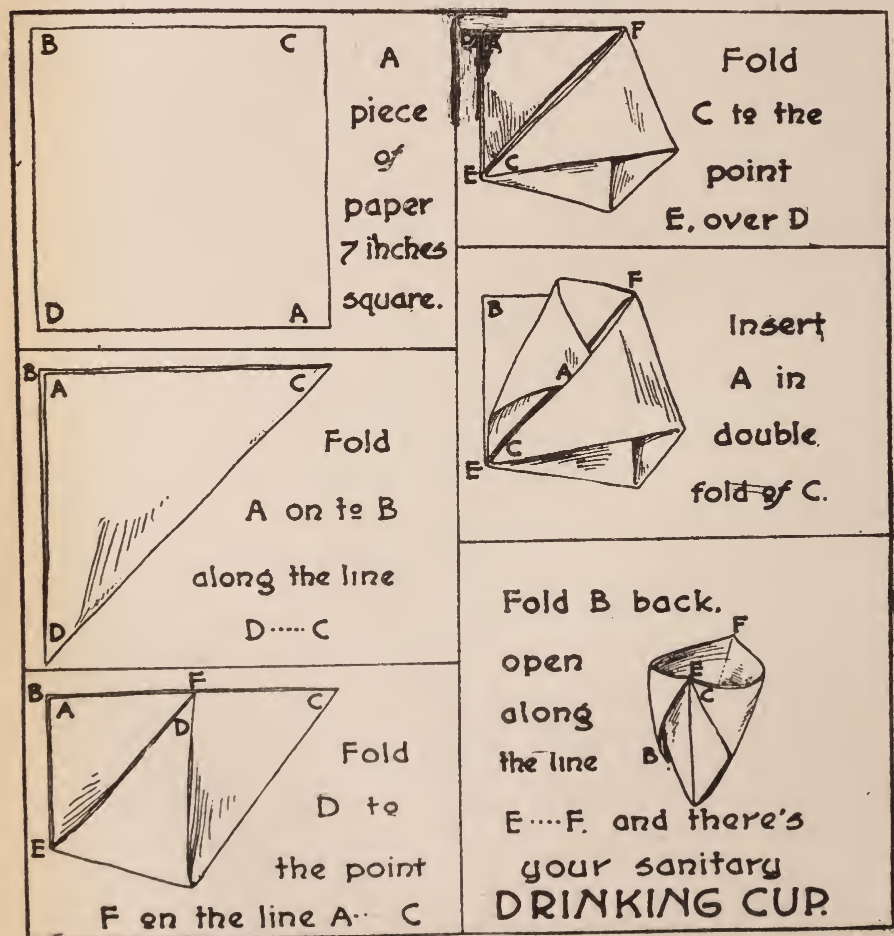
Cheap Bubble Fountains. Those interested in abolishing the common drinking-cup have often encountered the difficulty of expense in the installation of the drinking fountain with the bubble cup. Two eastern cities offer inexpensive solutions of that difficulty. In one, in which the common drinking-cup was forced out by state laws, an immediate compliance was necessary, and the simple expedient was resorted to of merely removing the cups in all public places and turning the faucets upside down. In this position, when turned on, the tip of the faucet formed a "bubble-cup" and was found satisfactory enough to be continued permanently as a drinking fountain.

The other method consists of a straight metal arm about eight inches long connected with an ordinary faucet, the arm being a plain piece of piping with a cup-shaped tip for drinking purposes. A more elaborate form of this arm-extension to an ordinary faucet provides a double pipe, one enclosed in the other, the smaller pipe taking the water to the cup at the tip, from which the waste water is carried back in the larger pipe to the waste pipe. There is thus no over-flowing at the cup-tip of the arm as there is in the other methods.—(The Survey, July 22, 1911.)

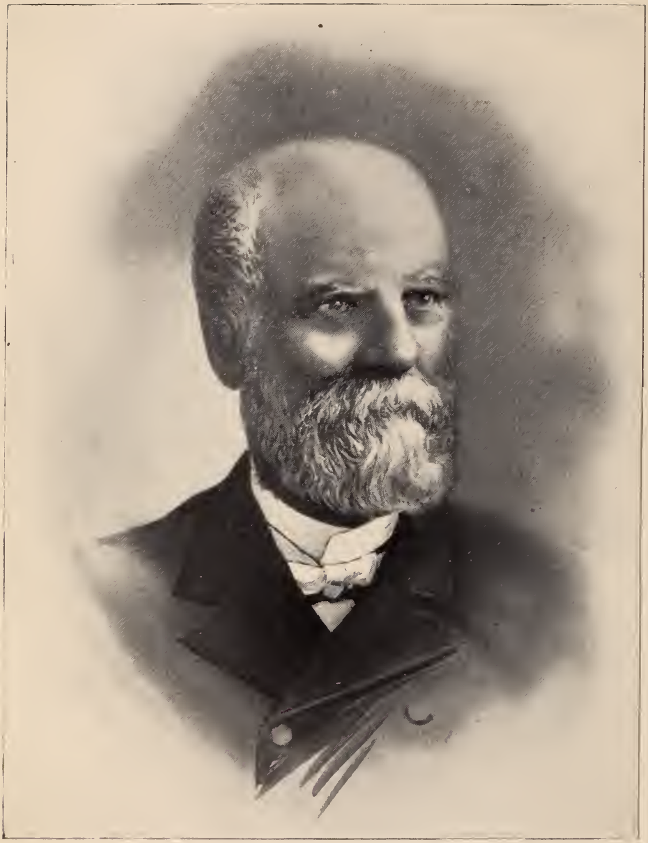
The University of Michigan has conferred the honorary degree of Doctor of Public Health on Dr. W. A. Evans of Chicago, and Dr. Guy L. Kiefer, Health Officer, of Detroit.—(Journal A. M. A.)

Health Officers' Association. At Charlotte, June 19, the North Carolina Health Officers' Association was formally launched, with the following as officers: President, Dr. Lewis B. McBrayer, Asheville; vice-president, Dr. Lucius H. Glenn, Gastonia; secretary-treasurer, Dr. Watson S. Rankin, Raleigh. The constitution and by-laws adopted limit membership to members of state, county or municipal boards of health or employees of the same.—(Journal A. M. A.)

HOW TO MAKE A PAPER DRINKING CUP.



(Devised by DR. H. ST. CLAIR—Health Dept., Chicago.)



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William Bailey.

IT has been the duty of the Committee on Necrology to record, from time to time, the passing of some of the oldest and best loved members of the American Public Health Association; but seldom has its sense of real loss seemed greater than when called upon to chronicle the death of Dr. William Bailey, of Louisville, Ky., who died on July 15, 1911.

Dr. Bailey was born in Bridgeport, Ky., in 1833. He received the degrees of B. A. and M. A. from the Kentucky Military Institute and his medical degree from the Kentucky School of Medicine, subsequently the Hospital School of Medicine, of whose faculty he later became president.

On the outbreak of the Civil War he enlisted on the Union side, becoming surgeon in the Ninth Kentucky Cavalry with the rank of Major. In 1863 he settled in Louisville of which city he remained a resident. At the time of his death he was professor of materia medica, therapeutics, and public hygiene in the University of Louisville.

Dr. Bailey was a member of many organizations, among them several local medical societies, the State Medical Society, the American Medical Association, and the American Public Health Association, and served each of them, with the exception of the American Medical Association, as president. He was a member for many years, and president at the time of his death, of the State Board of Health of Kentucky, which has stood since its inception for the highest ideals in public medicine.

The interest which Dr. Bailey took in the work of the American Public Health Association was shown by the regularity with which he attended its conventions, for he seldom missed a meeting, even during the latter years of his life. To many of the members the opportunity of seeing Dr. Bailey was one of the greatest pleasures of the annual convention. Dr. Bailey was elected president of the Association in 1895. In the many years that he was a member of the Executive Committee, no one was more constant in attendance, or showed more interest in the questions discussed, and no one's opinion was listened to with greater respect.

Dr. Bailey was a man quite beyond the ordinary, not only in those qualities which are the essential attributes of a gentleman, but also in those yet more delicate traits which mark the true physician. He possessed that intellectual refinement which comes from constant intercourse with the best representatives of his profession and from unremitting study. Even in the busiest years of his life he was not too busy to devote three hours a day to reading and study.

"*Vir propositi ingenii* may well be his epitaph, while the historical records of the American Public Health Association will be the richer for having such a name added to the roll of honor of its departed members, who, though dead, speak.

To Mrs. Bailey and her family the sympathy of every member of the Association is extended.

PETER H. BRYCE.

EDITORIALS

THE CHOLERA SITUATION.

CHOLERA has been present for several years in Russia during the summer, autumn, and early winter. Occasional limited outbreaks have occurred in other countries of Europe, the source of infection usually being traced to Russia.

During August, 1910, cholera appeared in several localities in Italy, and continued to be present up to January 30th of the present year. No further cases were reported until June 8th, since which date the disease has prevailed in many localities in Southern Italy, among which are the ports of Naples and Palermo, the latter being in Sicily. The presence of the disease in Italy has been, and is, of special importance to the United States because of the large number of immigrants who come from there to this country, most of whom sail from the ports named. Between June 8th and August 12th of this year, there have been reported in Italy 5,591 cases and 2,199 deaths.

On June 13th the steamship Berlin arrived at New York from Italian ports with the history of having had a death at sea from cholera. On the following day the Europa arrived at New York Quarantine with a case of cholera aboard, and on June 20th the Duca Degli Arbuzzi arrived with four cases. Other vessels also arrived with cases of cholera, or cholera carriers.

The occurrence of these cases among passengers who had been detained under observation for a period of five days before embarkation indicated that cholera carriers were becoming an important factor. Cholera bacillus carriers are individuals who carry the vibrio of cholera in their intestinal tracts, or probably at times in the gall bladder, and yet exhibit no clinical symptoms of the disease. Persons who have had the disease and recovered may continue to be carriers for days or weeks, others may be carriers for a short period before developing clinical symptoms, and still others, who have been in direct or indirect contact with the sick or with other carriers, may become carriers for varying periods without being ill at any time. In places where cholera is epidemic there will usually be found a number of healthy carriers. Passed Assistant Surgeon McLaughlin found six to seven per cent of carriers among healthy individuals living in the infected neighborhoods in Manila. The cholera carrier is undoubtedly a much more potent factor in the spread of the disease from one locality to another than are actual cases of the disease. The sick are readily detected and

isolated, but the detection of healthy carriers is a far more difficult problem and requires a careful and painstaking bacteriological examination, which usually takes at least two days to complete.

In compliance with the United States Quarantine regulations, persons coming from cholera infected localities are detained under observation for a period of five days before being allowed to embark at foreign ports. On account of the continued prevalence and spread of the disease in Italy the United States consuls at all Italian ports have been directed to hold all steerage passengers five days, no matter from what section of Italy. They are not allowed to take foodstuffs on board.

These precautions have apparently blocked all avenues by which the disease could be brought to this country with the possible exception of the cholera carrier, to eliminate whom an addition was made to the quarantine regulations July 19, 1911, requiring that all steerage passengers arriving at United States ports from ports or places infected with cholera shall be subjected to a bacteriological examination, and shall not be admitted to entry until it has been determined by said examination that they are not cholera bacillus carriers. This regulation was put immediately into force, and experienced officers were detailed to those ports where the maritime quarantine is not in charge of officers of the Public Health and Marine Hospital Service, but which are, nevertheless, subject to the Treasury Department regulations, and at which immigrants arrive from infected territory.

The bacteriological examination of every steerage passenger from an infected port or place at first seemed too great an undertaking to be practicable, but it has been and is being successfully done. Thus at Boston, the steamship Canopic arrived August 8th, with 297 second cabin and 896 steerage passengers, a total of 1193, and their examinations were concluded in fifty-four hours. Ten expert assistants had been specially trained for the work. In New York, some ten or fifteen bacteriologists, including those regularly attached to the quarantine station, those detailed from the State Department of Health at Albany and one from the Public Health and Marine Hospital Service, are successfully engaged in this work, aided also by the laboratory of the Health Department of the city of New York. This is a notable advance in scientific maritime quarantine.

Similar restrictions were placed by the Canadian government July 27th on steerage passengers coming from Italy either directly or via intermediate ports. This makes it impossible for immigrants to enter the United States by way of Canada without undergoing a bacteriological examination.

In spite of all the enumerated precautions, there is a possibility of the admission of an immigrant cholera carrier. In order that a case may be discovered early, should such an event occur, the state health officers are notified of all immigrants destined to their respective states. It is important that the state and local health authorities exercise a surveillance over these immigrants for the prompt detection and examination of cases simulating cholera, the most important factor in preventing the spread of the disease being the recognition of cases as near the time of onset as possible, and especially the mild and atypical cases.

For the purpose of furnishing aid for rapid diagnosis and the prompt institution of suppressive measures should cholera carriers or cases be suspected or found, the Service has stationed officers, who are available for duty within a practical radius of their stations, at the following named ports: New York, Boston, Washington, D. C., Chicago, San Francisco, New Orleans, and Savannah.

The Bureau has also published and widely distributed a pamphlet on "Cholera: Its Nature, Detection and Prevention," prepared by Passed Assistant Surgeon McLaughlin, who was in charge of the successful measures in stamping out an epidemic in Manila in 1908. This pamphlet contains a full account of the history, etiology, pathology, symptomatology, bacteriological diagnosis and preventive measures necessary to be taken immediately upon the discovery of a case.

So far the only cases of cholera which have been reported as developing in the United States outside of quarantine are the following:

One case developed in Auburn, N. Y., in the person of an immigrant who had been detained in quarantine seven days, and at Ellis Island one day. This case was not verified bacteriologically.

One case developed in Brooklyn, in an immigrant who had been detained at quarantine seven days. Upon diagnosis this case was returned to quarantine.

One case developed on Staten Island, in an employee who had previously been guarding the apparently well at quarantine. After falling ill he was returned to quarantine.

One case developed in New York, in a Spaniard who had arrived on a steamship from South American and West Indian ports. This case likewise was taken to quarantine.

One case developed in Boston, in an Italian woman. She was removed to Gallop's Island quarantine, where she died July 20th. The diagnosis of cholera was later verified bacteriologically.

It should be further stated that the steamship companies represented in the Transatlantic Passenger Conferences have agreed to co-operate by

endeavoring to restrict emigration as far as possible from infected places, and there has already been curtailment in the sailings from Mediterranean ports.

In Russia the disease, which was so virulent during the last summer and fall (about two hundred thousand cases and about one hundred thousand deaths being reported) disappeared in the late winter, but reappeared to a limited extent in the spring, and now appears to be on the increase in several of the "governments," though it has not yet reached the proportions of a great epidemic.

It is believed that with all health authorities, national, state and local, alive to the importance of the situation, there should be little likelihood of the disease gaining a foothold in any locality.

WALTER WYMAN, *Surgeon-General*,
Public Health and Marine Hospital Service.

THE CHOLERA SITUATION.

THE aspect of the cholera question has undergone a change in recent years by reason of a better knowledge of its cause and prevention. Bacteriological methods afford an immense advance in the accuracy of diagnosis and a very great security against any careless treatment of a first case, from which the disease might spread. In the treatment of a cholera outbreak, instead of the great energies which were formerly employed on curative efforts and inefficient preventive measures, it is now recognized that the great object, as in typhoid, is the immediate and total destruction of the patient's excreta, and that effective attention to this single duty would be a sufficient preventive of the spread of the disease. In other words, there seems to be no reason why a case of cholera might not be treated, with perfect safety to others, in a hospital ward where patients with other diseases were confined.

The opportunities for the spread of the disease are greater than formerly, because of our increased transportation facilities, but this is more than offset by our improved knowledge and equipment in handling the disease. Today we need not expect a prevalence of cholera or even a serious condition from it, anywhere in a civilized country. It is not likely, with the sanitary equipment of our modern cities and with the present intelligence of the medical profession and of the laity, that cholera will again prevail or spread as it formerly did. It is, of course, our duty to see that this disease does not procure a foothold in this country, and this is a much easier proposition than that of eradicating it should it become established.

In times, such as the present, when cholera exists in foreign ports, we look to the officials on guard there as well as those at our own ports of entry, to observe those precautionary measures which science and experience have demonstrated to be effectual. The United States has a few representatives in foreign ports to safeguard our interests by inspection, and by detention if necessary, of immigrants before departure, but these officials are not in sufficient number to render their inspection a satisfactory guarantee of safety.

If we would prevent risks in the easiest way, it would be by strengthening this inspection and detention at the port of departure. Were it possible to sufficiently detain and to examine bacteriologically every person before departure from an infected foreign port, we might absolutely prevent the transfer of cholera to this country. Such bacteriological tests,

for instance, as were recently and rightly required at our ports by the U. S. Public Health and Marine Hospital Service should be made abroad before departure of the vessel. Such a passenger list, free from cholera as shown by bacteriological tests made before departure, with more than five days en route and with no suspicious sickness on board, would require but little examination and need cause no anxiety at the port of entry. In the event of this bacteriological work not being done at the port of departure, inspection there is but an aid, a partial security, and in such cases rigid inspection and detention at the port of entry for all cases coming from infected or doubtful districts must be required. Of the two systems, greater benefit could be found in the complete work at the port of departure, and it is much better to make this complete inspection, leaving but a casual observation at the port of entry.

During the present outbreak of cholera in various foreign ports, the Boston officials have carefully carried out the recently added requirements in detention and bacteriological work. The single case of cholera found in this city was quickly removed and quarantined on suspicion as soon as discovered, and immediate and stringent precautions were taken. No cases developed among those exposed, and all danger of such cases is now long past. The S. S. Cymric from Liverpool arrived in this port July 27th with 139 steerage passengers from Russia, Turkey, and Syria. These immigrants were detained for bacteriological examination but none were found to be carriers. The S. S. Canopic from Naples, Italy, and the Azores, arrived August 8th with 1198 passengers from the former and 490 from the latter. All in the second and third class from Italy were detained and examined bacteriologically and were found negative.

With the present guard maintained here as a port of entry, the risk of importation of cholera is very small. Extreme measures at any port of entry for vessels should be avoided, since we are readily able in our present stage of advanced knowledge to detect and remove single cases of cholera. Only strictly scientific measures should be used in the treatment of this subject and all unnecessary obstruction to commerce should be avoided.

S. H. Durgin, M. D.,
Chairman, Boston Board of Health.

SPECIAL ARTICLES

THE BACTERIOLOGICAL EXAMINATION OF FECES FOR VIBRIO CHOLERAE.*

By A. M. STIMSON,
Passed Assistant Surgeon, Public Health and Marine-Hospital Service.

Asiatic cholera is a disease of short incubation, the majority of cases coming down with marked symptoms within a couple of days of exposure, and a very few cases after as long as five days. It would seem, therefore, that the ordinary detention period of five days for ships from infected ports, together with the period of observation during the long sea voyage, should offer adequate protection against the introduction of cholera into the United States. Unfortunately, however, it is a fact that numbers of people in cholera-ridden districts become carriers of virulent vibrios without exhibiting any symptoms which would lead to their detection. Some of these persons have recovered from mild attacks of cholera, either recognized as such or dismissed with a diagnosis of diarrhea, gastro-enteritis, etc., while others have had absolutely no recent illness so far as can be determined. To meet the danger offered by these carriers, the quarantine regulations of the Public Health and Marine Hospital Service have been modified so that a bacteriological examination must be made of all steerage passengers from infected ports. These measures undoubtedly tend to minimize the introduction of carriers, but it can hardly be claimed that they are competent to absolutely prevent it, for the reason that a single examination might not detect intermittent carriers. It would not be surprising, therefore, if isolated cases of cholera were to develop among recently arrived immigrants, or in those directly or indirectly associated with them, and lead to serious results if not detected in time.

For this reason it is deemed opportune to outline a method for the examination of suspected cholera cases or carriers which it is believed will be efficient in demonstrating the vibrio if it is present, while being as saving of time and labor as is compatible with thoroughness. It must be pointed out, however, that in all probability cholera carriers sometimes

* From the Hygienic Laboratory, U. S. Public Health and Marine-Hospital Service.

pass feces which are free from the vibrio, in other words, that their emission of the germs is intermittent. Several successive negative results would therefore be necessary to give absolute security, though a reasonably complete elimination of carriers could be secured by a single thorough examination.

Securing the Specimen.—It is necessary that specimens should be reasonably fresh, otherwise when vibrios are few in proportion to other bacteria they will be outgrown, and their detection rendered difficult or impossible. Again the specimen should be sufficient in amount. While the routine examination of the amount of feces adhering to a rectal swab after it is drawn through a tight sphincter is undoubtedly capable of demonstrating a proportion of carriers, the writer believes that this method is inadequate, and might be disastrous in giving a false sense of security. It is recommended, therefore, that the specimen be taken from a fresh stool which has been received into a clean receptacle and untreated with disinfectants. This last point would seem superfluous to mention were it not that, especially in hospitals, it is sometimes necessary to instruct nurses or orderlies to omit the routine addition of disinfectants to bed pans. The writer ventures to suggest a method of securing specimens where persons are being examined on a large scale (e. g., at quarantine), which method he has not tried, or seen tried, but which appears to him to have advantages. This plan is to receive the dejecta into a wooden receptacle such as small quantities of butter are retailed in, this butter dish or cup being placed in the bottom of a chamber pot or bed pan which could be treated with a liquid disinfectant after removal of the specimen. In this way the feces would be protected from the action of the disinfectant, while the time-consuming disinfection of the chamber pot by boiling water or steam would be avoided.

Where there is a difficulty in obtaining specimens of feces because of constipation, a high enema of sterile water would be preferable to the use of aperients. Or the material collected in the eye of a long rectal tube may be utilized. The use of aperients is apparently not free from danger, since in one case—a carrier without symptoms—a fatal infection was apparently induced by the local lowering of resistance caused by the administration of calomel and salts.

Material from autopsies should be taken from several portions of the small intestine, or loops a few inches long may be tied off, excised, and placed in jars until specimens can be taken. The vomitus is said to contain the vibrio sometimes, but a negative report should never be based on the findings in this material alone.

Planting the Material.—It is advisable that the material be planted in culture media as early as possible. Where many specimens are being examined, a laboratory attendant can do this at the hospital, detention barracks, or on ship-board. Where difficulties in the transportation of fluid media exist, the material can be taken up on a short flat stick (half of a wooden tongue depressor) and dropped into a sterile bottle or tube, or, if fluid, placed therein by means of a sterile spoon or pipette, and carried in this way to the laboratory. This extra handling involves considerable danger of infection and takes more time and labor. The first planting, in the writer's opinion, should always include the sowing of about 1 gm. (1 c. c.) of feces in a flask containing 100 c. c. of peptone solution, (1% peptone, 0.5% NaCl, neutral to phenolphthalein). In making a diagnosis where cholera is suspected, time may be saved by making plates directly from the stools, but this can hardly be done outside of the laboratory, and is not worth the extra time and trouble of the manipulation in searching for carriers. Flasks of peptone solution could, in many situations, be taken to the detention barracks or bedside, and there inoculated directly from the fresh specimen, an improvised carrying case made from a suit case, or box with racks to keep the flasks from breaking, being used for transporting them.

Incubation.—Where plates have been made directly from the stools, they should be incubated 18–24 hours and examined for characteristic or suspicious looking colonies (see below) which may then be tested for agglutination.

The flasks on the other hand, should be examined after about six hours incubation, and again after 12 and 24 hours incubation. The reason for the repeated examinations is that, depending on the nature and number of other micro-organisms, the cholera vibrios may be relatively more numerous and viable at various periods. It is generally believed that this organism grows more rapidly than other vibrios in peptone solution, hence the six hour examination. If very few in numbers and relatively pure in culture, the longer period of incubation would be more likely to detect them.

Examination of Flasks.—The writer is aware that at this point it is customary for many workers to make hanging-drop and smear preparations from the upper layer of the peptone culture, in order to determine the presence or absence of motile vibrios; but he regards the procedure as ordinarily too unreliable to justify the great amount of time involved where there are many specimens to be examined. The objections to it are, that where vibrios are relatively scanty they may readily be missed

in the hanging-drop; that stained preparations from peptone cultures are apt to be poor, owing to deposits of stain and massing of bacteria from the pellicle; and finally, that the procedure is superfluous, since a pure plate culture must be obtained by plating in any case before a positive diagnosis can be made, and vibrios in sufficient numbers to be detected in this manner would also be found among the plate colonies.

Where one is not pressed for time and desires to satisfy his curiosity as to the microscopic appearance of the growth, he should proceed as follows: tilt the flask, without agitating it, until the pellicle, if present, separates from one side of the flask, and then take the loops of culture from the clear surface thus exposed. In examining for motility, look at all parts of the hanging-drop, and at all depths, and tune the eye to catch an exceeding rapid darting motion, for this motion has sometimes been missed by those fairly well accustomed to the ordinary uses of the microscope. Stain the dried and fixed specimen with cold carbol-fuchsin (diluted ten times) and look for slightly bent rods. Most text-book illustrations show a more pronounced curve than does the average cholera bacillus, which is often hardly more than straight on one side and rounded on the other. Atypical morphology (involution forms, coccoid forms, short plump rods) while common in old cultures, appear to occur very seldom in freshly isolated young cultures.

The essential part of examining the flasks is therefore simply:

Plating the Peptone Culture.—Many plate media have been devised and used, which were designed to facilitate the demonstration of cholera vibrios by favoring their growth and restraining the growth of other organisms, notably *B. coli*, and also by permitting the cholera vibrio to build a colony of characteristic appearance. It is too much to say that these media are all worthless, but it is true that they are unnecessary.

The medium advocated by Dieudonne is perhaps the best of these, but its preparation is much more difficult than that of plain agar, requires a large supply of defibrinated beef blood, and takes up much space and time in drying. Plain nutrient agar (2% to 3% agar for firmness of medium, in ordinary nutrient bouillon, rendered neutral to phenolphthalein), answers every practical purpose, if enough well-made plates are available to give a large number of discrete colonies. The plates should first be poured, the surface dried for an hour or so in the incubator, and the peptone culture then stroked over the surface to produce surface colonies, which alone are of use. For smearing purposes a piece of $\frac{3}{16}$ inch glass rod, bent nearly to a right angle, is recommended. The short area should be

about 1½ inches and the long area 4 or 5 inches in length. This is conveniently used by loading the outer side of the short arm with one loopful of the surface peptone culture, and stroking the wet portion over the surfaces of successive plates. Where the ordinary sized Petri dishes are used, three will be necessary for those unexperienced in this method, in order to be sure of getting a good distribution of colonies. The large (18 cm.) plates offer a larger surface for colonies with fewer pieces of glassware to wash and sterilize.

The plates thus made are incubated at 35-36 degrees C., for not less than 16 hours, in order to allow the colonies to become large enough to be distinctive in appearance and furnish ample material for a preliminary agglutination test. This is also necessary since it is known that some strains of cholera vibrios are subject to isoagglutination in salt solution or normal serum when the growth is very young.

Examining the Plates.—If the second or third plate of a series should not give plenty of discrete colonies, replating is necessary to secure this result. The cholera colony is stated to have a characteristic appearance on agar, but there are other vibrios which form indistinguishable colonies, and various bacteria may form colonies which may excite suspicion and which must be therefore subjected to examination. In its typical form the cholera colony is round or slightly irregular in outline, is translucent, and on observation by transmitted light at various angles is opalescent, frequently showing an iridescent play of delicate tints. Control plates of a known cholera vibrio should be employed at first and various types of colonies examined until the bacteriologist is assured of his ability to recognize vibrio colonies.

Suspected colonies on the plates may at once be subjected to a preliminary agglutination test, first marking their position on the plate so that they can be again referred to, if necessary, for further examination. For this purpose it is suggested that small triangular pieces of gummed label bearing a number be pasted on the under side of the dish so that the acute angle points to the corresponding colony. Wax pencil marks are apt to be obscured or obliterated and lead to confusion.

Agglutination Tests.—The mainstay of the diagnosis of cholera is the bacteriological examination; the mainstay of this examination is the agglutination test to which all other procedures are but preliminary. In cases where the clinical picture arouses suspicion of cholera, and plates have been made directly from the stools, the colonies which develop may be examined after at least 16 hours incubation. There are several variations in the technique of applying this preliminary test, which consists

essentially of emulsifying a small portion of a colony picked up on a platinum needle in a drop of specific agglutinating serum dilution, and a similar portion in a drop of salt solution to act as a negative control. A positive control with known cholera vibrios should be made from time to time. Agglutination may then be observed with the naked eye if cholera organisms are present. To prevent too rapid drying of the drop the test is conviently made on a cell slide, the cell being protected by a coverglass sealed with vaseline. The dilutions used will depend upon the titre of the specific serum, but should be at least 1-200. This preliminary agglutination is quite sufficient for diagnostic purposes in public health work, but colonies so agglutinated should be fished to agar slants, and after 18 or more hours of incubation subjected to an accurate quantitative test to determine the maximum titre of agglutinability. This is conveniently carried out by emulsifying one standard loopful (approximately 2 mg.) of agar culture in each of a series of small tubes containing 1 c. c. of progressively increasing dilutions of the specific serum in salt solution. Control series should be made at the same time, one of known cholera vibrios in serum dilutions, and one of the suspected culture in plain salt solution, or preferably corresponding dilutions of the serum of a normal animal of the same species as that from which the specific serum was prepared. All cholera vibrios give agglutination with specific serum at or near the maximum titre. Other organisms do not. The tubes are placed in the thermostat and observed with the naked eye at intervals up to two hours. At this point, also, the motility of the organism may be observed in hanging-drop, and its morphology in a stained smear, or dried hanging-drop.

Health officers and others who may be called upon to undertake cholera examinations would do well to secure in advance a supply of reliable serum, as it is indispensable for accurate diagnosis and may not be readily obtained in emergency. Any bacteriologist having an authentic cholera culture can prepare such a serum from rabbits in the course of three or four weeks.

In this description no reference has been made to many characteristics of the cholera vibrio, cultural and otherwise, upon which text-book articles will furnish extensive information and perhaps lay some stress, for the reason that they are regarded by the writer as of more scientific than practical interest, the agglutination test being the criterion for identification of the organism.

The method recommended is in brief:

1. (a) In suspected CASES prepare plates directly from the feces and also employ step (b).

(b) In searching for CARRIERS plant 1 c. c. (1 gm.) of feces in 100 c. c. peptone solution.

2. Incubate 6 hours and prepare plates.
   Continue incubation 6 hours and prepare plates.
   Continue incubation 12 hours and prepare plates.
3. Incubate plates 16 or more hours.
4. Examine suspected colonies by preliminary agglutination test, and observe morphology and motility of those responding.
5. Plant colonies which agglutinate on agar slants and incubate 16 or more hours.
6. Make quantitative agglutination test of slant growths.

FOOTNOTE.—Since writing the above article the writer has had an opportunity to discuss methods with P. A. Surgeon McLaughlin, U. S. P. H. & M. H. S., who has had large experience with the bacteriological methods used in cholera cases in the Philippines, and recently in connection with the examination of immigrants in New England. Dr. McLaughlin favors the preliminary examination of the peptone culture by an extremely careful microscopic scrutiny of smear preparations before making plates, believing that a negative result justifies the exclusion of the specimen from further examination. The writer desires to express his entire confidence in this method when such skill as Dr. McLaughlin and his co-workers were able to bring to bear upon the work is available, and admits that much labor is spared by this method. However, when even good bacteriologists who have had little or no experience with cholera are suddenly confronted with the problem, with no opportunity to orient themselves in this particular work, it is believed that a smaller margin of error will be permitted in following the method described in this article.

A BACTERIOLOGICAL INVESTIGATION OF COMMERCIAL ICE CREAM IN THE CITY OF BOSTON.

By EDITH A. BECKLER and DELPHINE J. DUSOSSOIT.
(From the Biological Laboratories of Simmons College.)

Among the regulations for the manufacture, sale, and care of ice cream established* by the Board of Health of the City of Boston, Article IV, Section 2, reads as follows:

"No person, by himself or by his servant or agent, or as the servant or agent of any other person, firm, or corporation, shall in the City of Boston, sell, exchange, or deliver, any ice cream which contains more than 500,000 bacteria per cubic centimeter."

As investigations carried on in the District of Columbia by Dr. George W. Stiles and in Philadelphia by Dr. M. E. Pennington,† showed the average sample to have a bacterial content vastly in excess of 500,000 per cubic centimeter, the following investigation was made to find out whether or not the above mentioned regulation was complied with.

The samples collected were purchased in the open market, usually in half-pint pasteboard cartons; or if bought at soda-fountains, a portion was put into a sterilized glass-stoppered bottle of about 100 cubic centimeters capacity. Within an hour after purchase the samples were taken to the laboratory, and portions, sufficient in amount for bacteriological examination, were removed from the interior with sterile spoons and placed in sterile bottles to melt.

Since large numbers of bacteria were to be expected in a milk product, it was necessary to make high dilutions for the quantitative analysis. The technique used was, in brief, as follows: The melted ice cream was measured in standardized one cubic centimeter pipettes which had previously been sterilized by hot air and kept in bacteria-proof metal cases.

The technique and methods recommended by the Committee on Standard Methods for the Bacterial Examination of Milk, were followed by us in making dilutions, plating and incubating. The agar used was also that recommended by this committee.

In order to determine the presence of gas-producing organisms, one cubic centimeter of the 1:100 dilution was transferred to a fermentation tube containing 2% dextrose broth and incubated at 37° C. for 48 hours. When gas was produced, the amount was measured by the ruled scale method.

* August 4, 1906.
† Hygienic Laboratory Bulletin, No. 56.

This investigation extended from July, 1910, to January, 1911, and during that period 103 samples of commercial ice cream were collected from the manufacturers, department stores, small shops, and drug-stores in Boston. A summary of the numerical results follows:

Samples showing—

Less than 50,000 bacteria per cubic centimeter		0
From 50,000 to 100,000 bacteria per cubic centimeter		0
" 100,000 to 150,000	" " " "	0
" 150,000 to 200,000	" " " "	3
" 200,000 to 300,000	" " " "	3
" 300,000 to 500,000	" " " "	6
" 500,000 to 750,000	" " " "	5
" 750,000 to 1,000,000	" " " "	7
" 1,000,000 to 2,000,000	" " " "	11
" 2,000,000 to 5,000,000	" " " "	24
" 5,000,000 to 10,000,000	" " " "	22
" 10,000,000 to 25,000,000	" " " "	16
" 25,000,000 to 50,000,000	" " " "	3
" 50,000,000 to 100,000,000	" " " "	3
Above 100,000,000	" " " "	0

The average number of organisms per cubic centimeter was 7,993,721. The maximum count obtained was 97,000,000, and the minimum 150,000 per cubic centimeter. Of the total number of samples, 19.8% showed the presence of gas-producing organisms when 2% dextrose broth was inoculated with 0.01 cubic centimeter of the sample.

The presence or absence of streptococci was also investigated in all of the samples. Attempts were made, by centrifugalization, to secure a sediment which could be satisfactorily stained, but this method was soon abandoned on account of the debris obtained. It was usually possible to recognize colonies of streptococci on the plates, and when inoculated into bouillon, these developed into long or short chain streptococci. 82% of the samples of ice cream showed the presence of streptococci, and in the majority they were apparently present in pure culture.

During the course of this investigation it was thought advisable to find out whether or not ice cream could be made which would have a bacterial content within the legal limit. For this purpose cream, purchased from several dealers, was sweetened, flavored with vanilla, and frozen in a small freezer which had previously been scalded with boiling water. The ice cream was packed in the usual salt and ice mixture and allowed to stand for two hours, after which a portion was removed for analysis. The results were as follows:

	Bacteria per cubic centimeter		Bacteria per cubic centimeter
Sample 1:		Sample 3:	
Cream	2,000,000	Cream	4,000,000
Ice Cream	3,500,000	Ice Cream	1,300,000
Sample 2:		Sample 4:	
Cream	3,800,000	Cream	990,000
Ice Cream	2,300,000	Ice Cream	480,000

Samples 3 and 4 were kept frozen at a temperature varying from —10 C. to —20 C. for 12 days, portions being removed for analysis every 24 hours from sample 3 and every 48 hours from sample 4. The results are tabulated below:

SAMPLE 3.

	Bacteria per cubic centimeter		Bacteria per cubic centimeter
Fresh ice cream	1,300,000	After 6 days	510,000
After 1 day	820,000	" 7 "	1,000,000
" 2 days	1,200,000	" 8 "	2,200,000
" 3 "	990,000	" 9 "	4,100,000
" 4 "	960,000	" 10 "	25,000,000
" 5 "	800,000	" 11 "	37,000,000

SAMPLE 4.

Fresh ice cream	480,000	After 8 days	4,200,000
After 2 days	520,000	" 10 "	2,500,000
" 4 "	330,000	" 12 "	1,800,000
" 6 "	3,000,000		

Ice cream may be kept by the manufacturer, or more often by the retail dealer, for several days, and the possibility of changes in the bacterial flora during that period ought to be considered. Doctors Stiles and Pennington, in their investigations upon changes in ice cream during storage, found that although there was considerable variation in the behavior of different samples, there was often a pronounced increase in the numbers of bacteria.

The cream is obviously the source of the majority of the bacteria found in ice cream. During the course of this investigation 41 samples of cream were analyzed bacteriologically. The results were as follows:

Samples showing:

Less than 10,000	bacteria per cubic centimeter	0
From 10,000 to 50,000	" " " "	4
" 50,000 to 500,000	" " " "	4
" 500,000 to 1,000,000	" " " "	
" 1,000,000 to 2,000,000	" " " "	5
" 2,000,000 to 5,000,000	" " " "	12
" 5,000,000 to 10,000,000	" " " "	3
" 10,000,000 to 30,000,000	" " " "	9
Above 30,000,000	" " " "	0

The average number of organisms per cubic centimeter was 5,553,170. The maximum count was 26,400,000 and the minimum 10,000 per cubic centimeter. Thirty of the samples were examined for the presence of gas-producing organisms. Of this number 19, or 63% gave positive results. Streptococci were found in 30 of the samples, or 73% of the total number.

It is a well-known fact that gastro-intestinal diseases are not infrequently traced to the eating of ice cream.* During the summer of 1910 the Women's Municipal League of Boston, through its Committee

*Hygienic Laboratory Bulletin, No. 56.

on Ice Cream and Butter, conducted an investigation of the manufacture of ice cream. The committee worked in conjunction with the clinics at the Infants' and Children's Hospitals, and when cases of illness, probably caused by ice cream, were reported, the place of purchase was investigated. An inspection of the premises often showed very dirty conditions, but several places, on second inspection, showed marked improvement. The Board of Health is assisting the committee by printing, in various languages, the regulations for the manufacture, sale, and care of ice cream.

GENERAL CONCLUSIONS.

The bacteriological examination of ice cream in the city of Boston shows that much of it contains more than 500,000 bacteria per cubic centimeter—the legal maximum. This is due partly to the large bacterial flora of the cream used, to long storage of the product, and in some cases to unsanitary methods of manufacture.

Our analysis of samples of cream indicate that even the careful manufacturer, unless he has an exceptionally good cream supply or depends upon pasteurization, cannot expect to produce ice cream with a bacterial content within the legal limit.

[We wish to acknowledge the valuable assistance which we have received on the preparation of this paper from Mrs. Charlotte Barrell Ware, of the Wareland Dairy School.]

American Public Health Association

THE RELATION OF UNIVERSITIES TO PUBLIC HEALTH WORK.*

By H. W. HILL, M. D., D. P. H.,
Director, Division of Epidemiology, Minnesota State Board of Health.

This subject originally was to be treated in the form of a symposium, by three university presidents and three state board of health representatives. The university men approached failed to accept, and the President turned the whole matter over to me. Finding the time too short and the date of meeting inauspicious for securing papers from those universities, i. e., of the middle and western states, from whom we had hoped most, I believed it best to throw the whole matter open to general discussion by asking representatives of several state boards who have university connections to open the discussion.

Frankness and publicity will cure most ills and promote most good ends. The acuteness of the situation in some states suggests the need of the true relationships which should exist. I wish merely to outline the basis upon which the relationships are sometimes urged or established, leaving it for others to comment, if they choose, on the reality or otherwise of these claims. My main point is this:—To ask that this Association appoint a committee of thoroughly representative men to consider this subject fully in all its aspects and to report the basic principles upon which such relationships may be established—perhaps even to present a model contract which may be adopted or adapted by universities and state boards of health in seeking alliance with each other.

I do not believe that this is a matter which an individual state board of health can consider an affair wholly peculiar to itself, or concerning which it can in any way resent interest in the arrangements made.

The state boards are bodies few in number but immensely influential. They have among themselves common interests and inter-relations still more common. The tendency has been to unify methods and to secure coöperation between them. In unity is strength, and a board which follows a course approved, or already adopted by other boards in conference, is treading on very dependable ground. Universities also, it may be assumed, are bodies of high intelligence and high purpose. It is difficult to imagine any university unwilling to accept a fair and logical arrangement, based upon legal requirements as well as upon justice and efficiency.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

It is the university which usually seeks the alliance, and the university should find the state boards ready with equitable and enforceable propositions, not with mere verbal or temporary agreements, drawn up at random to suit the individuals concerned at the moment. Permanency can only be secured on a basis of logical and legal arrangements which provides as far as possible, in its principles at least, for the future as well as for the present.

The alliances heretofore made have most commonly taken the form of securing for the state board of health a laboratory location, and facilities or men from the university medical school, in part or in whole. The relative finances of the state boards of health and of the university are usually such that the pooling of salaries, the saving of rent, and sometimes the saving of equipment, appeal to the state board of health as economies; while the university counts on getting its money's worth in the presence of the state board of health's laboratory on the campus, the hope of the educational effect of its presence on students, and the hope of securing abundant material for university teaching purposes from the laboratory. The coöperative idea is also a strong one. The state board hopes to secure a certain amount of help, advice, support, or even prestige from its university connections. The university hopes to be able to show its labors in connection with the state board of health as an example of the practical character of its work, outside of and in addition to the teaching of students. Mutually, both bodies hope that the alliance will prove of value in securing legislative support and impressing the alumni, especially the medical alumni, with the advances which have been achieved.

Beyond laboratory alliances, attempts have been made to secure coöperation in engineering and in epidemiological fields. To the overworked and short-handed state board, visions appear of troops of well-trained, energetic young students, both medical and engineering, flocking out under the guidance of their professors, at the emergency call of the state boards, to investigate epidemics of typhoid fever or problems in sewage disposal or water supply. To the university man, weary of book teaching and anxious to demonstrate to his students what an epidemic is, and how to handle it in practice, or how to solve actual water supply problems on the ground, rather than paper problems in the classroom, the same vision appears, although with a very different aspect and meaning.

It is with the disillusions as well as with the realizations, the failures as well as the successes, the incongruities as well as the symmetries, the impossibilities as well as the inherent necessities of such alliances, that this discussion is to deal.

There are adjustments, not only financial, educational, and coöperative, but dependent on the different legal and governmental status of the two bodies, their facilities in men and authority as well as in buildings and equipment, the execution each of its own proper duties as well as the sharing of the burdens each of the other. That truly successful, really helpful, mutual coöperation may, should, and even must exist, if we are to get the best out of both for the future of public health is, I think, beyond question.

But the *modus operandi* must be determined, and the proper adjustments reached, otherwise the whole structure will come down in a dust of misunderstanding which will make it appear to outsiders that scientific progress meets obstacles from its own professed leaders as great or greater than from its traditional difficulties in other lines. Such failures are the more pitiable because both parties must be credited with high ambitions for the progress of the public good, and the failures to attain depend, in my judgment at least, not on mistakes in the objects sought, but in the lack of clearly defined principles in seeking them.

Each must first perform its proper duties in its own sphere before reaching out to aid the other. Always there must be the line drawn between what must be done to fulfill each its own functions, and what may be done by coöperation to aid in general progress. The state board is an arm of the government; it exercises some of the police powers of the state; it has certain very definite responsibilities and obligations which it can share with no one ethically, legally, or practically. The university is a teaching body under the control of the state; its responsibilities cease with the proper education of its students, however broadly "proper education" may and should be interpreted. It would seem well to determine, first of all, what is the business of each. In doing one's own work, however, it is easier and better to do it so that the work of others may be facilitated, rather than injured or even left in a neutral position. The ultimate ideal is, of course, to reach through thorough efficient work by the various bodies, a co-operation which will make one really co-ordinate system.

THE ADVANTAGES OF CO-OPERATION BETWEEN STATE BOARDS OF HEALTH AND STATE UNIVERSITIES.*

By Prof. E. H. S. BAILEY,
University of Kansas, Lawrence.

In the discussion of a question of this kind I believe all will admit that we are upon untried ground, and that we are here to consider the results of a few experiments that have been made, and to work together for what seems the best policy for the future. It is proper also for us to suggest reasons for our belief or disbelief in the practicability of the plans that are suggested for bringing about this close relation between the universities and boards of health.

The conditions in the State of Kansas are about as follows: In 1905 a law was passed authorizing the State Board of Health to take samples of food and have them analyzed at the Agricultural College and the University, and to publish the results. Practically no appropriation, however, was made to carry out the provisions of this law. Soon after, the State Board of Health, under this law did begin the agitation for better foods, and started the crusade against adulteration and misbranding by having analyses made and published.

Later, when the national pure food and drug law was passed, our previous work paved the way for the passage of the state law, the enforcement of which was placed in the hands of the State Board of Health. The examination of the foods and drugs taken by the inspectors was to be made under the supervision of the directors of the chemical and pharmaceutical laboratories of the State University and the State Agricultural College, which, in this state, are separate institutions. By agreement, different work was assigned to each institution. The state institutions were also authorized to employ sufficient help to do the analytical work expeditiously, so it came properly into the biennial budget of these institutions.

A law was also passed (1907, amended 1909) authorizing that the work of the State Water Survey should be carried on at the State University, under the direction of the State Board of Health. Later, in 1909, a weights and measures law was passed continuing the chancellor of the university as *ex-officio* state sealer, and putting the enforcement of this law in the hands of the State Board of Health.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

At the present time the secretary of the board is a regular lecturer on foods and drugs in the university and the members of the board are invited to take part as lecturers in a short course offered by the university to city and county health officers. Research work has been carried on in the university laboratories on water supply, purification of water and of sewage, milk supply of cities, food adulterations, and upon special problems such as the cause of infantile paralysis. This work has been done in the chemical, bacteriological, engineering and medical departments of the university. These are the points where the work of the State Board of Health touches that of the State Univeristy.

The reasons that have led to the attempt to secure close co-ordination between the work of the State University and the State Board of Health may be briefly stated as follows:

First: The university should be, as it is rapidly becoming, the intellectual and scientific center of the state. All work of a scientific nature which is done under the direction of the state, should be carried on with the coöperation, to say the least, of the university authorities. This is in accordance with the general tendency, which we cannot resist if we will, to unify and combine all related interests for the better performance of the work as a whole. In accordance with this same principle, that scientific work which particularly relates to the business of the farmer is carried on under the direction of the Agricultural College. On this account we unite here the work of the Agricultural Experiment Station, of the Entomological Commission, the Dairy Commission, and the Forestry Station. The work of the State Geological Survey and of the Fish Commission is done under the direction of university professors.

Second: It has been wisely said that the funds of the state can be much more economically expended if we utilize laboratories that are already built and equipped, libraries that are collected, scientific instruments that are already the property of the state, and a trained corps of men familiar with scientific work, and capable of carrying on research. The construction and equipment of laboratories to carry on work in food analyses, water analysis, bacteriological examinations, and research in various lines, would require the expenditure of considerable money, and much of it, we believe, would be needless. These facilities are already furnished by the universities, and only require enlargement and trained men to do the work to supply the needs of the State Board of Health.

Third: When the scientific work is conducted at the state institutions, those who are working in related lines of investigation are accessible for consultation and advice. There is, in fact, a force of trained men who may together consider the problems.

Fourth: A much larger and more influential class of people in the state will learn of the work of the State Board of Health, and will thus be ready to give it their support. It will, we think, be admitted that much of the work of the board is educational. If this is true, where can we better begin the work of getting near the people than by coöperation with the educational institutions where so many of the sons and daughters of the people are educated?

Fifth: From the standpoint of the student of the university, there will be the opportunity of recognizing that the State Board of Health is one of the great agencies employed for improving the condition of the people of the state. If the State Board of Health is recognized at the university, and some of its work is done there, the student will know enough about it when he returns home, so that he will support the efforts of the board in his own town when they try to enforce the laws for pure food, pure water, and sanitary surroundings.

Sixth: It would seem probable that the closer the relation between the board of health and the educational institutions, the better will be the opportunity for an economical expenditure of the funds of the state. There will be less opportunity for showing favors to political friends, and thus by implication there will be more efficient service.

These, then, are some of the reasons why we believe the experiment ought to succeed. While admitting that, in many of its phases, the work of the State Board of Health must be absolutely distinct from that of the State University, because this board has a certain police power to aid it in protecting the citizens, we do believe that from the broad view of those who want to see the BEST results for the GREATEST NUMBER of the people of the state, there should be maintained the closest possible coöperation that is practicable between these great state institutions.

THE RELATION OF THE STATE UNIVERSITY OF NORTH DAKOTA TO THE STATE BOARD OF HEALTH.*

By Dr. GUSTAV F. RUEDIGER, M. D.,
Director, State Public Health Laboratory, University of North Dakota, Grand Forks, N. D.

We must have a definite ideal before us if we wish to establish the best relations between the State University and the State Board of Health. I believe also that there should be some uniformity in these relations in different states, but we must take into account existing conditions. It is very well to have an ideal before us, but when the existing conditions are such that we cannot attain this ideal we must be satisfied with the nearest possible approach to it.

I shall confine my remarks almost wholly to the relation of the State University to the State Board of Health of North Dakota, as I have given that question a great deal of thought

There is at present practically no relation at all between these two state departments. The state public health laboratory is located at the university; it is controlled by the university, and its funds are in the trust of the board of trustees. The legislative act creating the public health laboratory, which reads as follows, will make clear this relation:

SEC. 1. There is hereby established a Public Health Laboratory. Such laboratory shall be established at the State University and School of Mines; it shall be under the control and regulation of the trustess of the university, and the professor of bacteriology and pathology at the State University shall be the director of said laboratory.

SEC. 2. It shall be the duty of the director of said laboratory to make bacteriological examinations of body secretions and excretions, waters and foods; and make preparations and examinations of pathological tissues submitted by the state superintendent of public health, or by any county superintendent of public health, or by any regularly licensed physician of North Dakota. These analyses and preparations shall be made and the results furnished as expeditiously and promptly as the nature of the work and the equipment of the laboratory permit.

SEC. 3. The board of trustees shall cause to be collected and tabulated such sanitary statistics, and shall cause to be ascertained by research work such methods, as will lead to to the improvement of the sanitation of the various parts of the state.

SEC. 4. It shall be the duty of the said board to cause proper specimens of bacteriological and pathological material, discovered or examined in the work of said laboratory, to be skillfully prepared, secured, labelled, and preserved for public inspection free of cost in the University of North Dakota in rooms convenient of access and properly furnished and in charge of a proper scientific curator.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

Sec. 5. The director of said laboratory shall cause to be issued from time to time, bulletins and reports setting forth the results of the sanitary and pathological work done in such laboratory. The substance of these bulletins and reports, embodying all useful and important information resulting from the work carried on in such laboratory each year, shall be incorporated in an annual report to the Governor, who shall lay the same before the Legislative Assembly.

Sec. 6. The professor of bacteriology and pathology in the medical college of the State University shall be the director of the public health laboratory and shall be *ex-officio* the state bacteriologist.

The laboratory is under the control and regulation of the trustees of the university and is in no way under the control of the State Board of Health. The laboratory is, however, directed to make bacteriological examinations of material submitted by the state superintendent of public health, and by the county superintendents of public health. Under this clause the State Board of Health can direct the laboratory to make various kinds of bacteriological examinations which have a bearing on the public health of the state. Up to the present time, however, although the laboratory has been in existence for over three years, the State Board of Health, as such, has never directed the laboratory to make any investigations. The individual members of the board, however, are regularly sending material for diagnosis from their private practice.

I believe that the State Board of Health would not lose its prestige if it took advantage of the facilities offered by the laboratory in making investigations for the board. Under the present arrangement the State Board of Health could get due credit for the work thus performed for it by the public health laboratory, and the laboratory also could get its share of credit, because it could incorporate in its annual report to the Governor all reports sent to the State Board of Health.

I do not believe that our present arrangement is particularly disadvantageous to the State Board of Health, although at first glance it may seem so to be. The only change that I would advocate in our arrangement would be a closer affiliation between the public health laboratory at the university and the State Board of Health. Under the existing conditions I believe this could best be accomplished by making the director of the laboratory *ex-officio* a member of the State Board of Health. This would in no way handicap the latter, nor would it detract in any way from the credit due the board for work performed, or directed to be performed by them. It would, however, tend to bring the two bodies closer together, and thus unify the work. At present there is danger that the two bodies will pull in opposite directions, a contingency which would greatly hamper the work of both the State Board of Health and the public health laboratory. It is nct necessary that the director of the laboratory should have any executive authority, but if he were given a voice on the

board of health, his suggestions, based upon his laboratory experience, would be certain to have great value.

Although the director of the laboratory need not be given any executive authority, he should not be made an underling who can act only as he is directed by the executive officers of the board. In other words, the laboratory men should have perfect freedom to make independent investigations, and to issue bulletins from time to time based upon their independent investigations. This work need not be a duplication of the work performed by the State Board of Health, and would in no way detract from their glory.

I am in favor, therefore, of placing the State Public Health Laboratory under the control and regulation of the State University, under the direction of the professor of bacteriology or pathology. I believe that the laboratory should perform the work it is directed to do by the State Board of Health, sending the reports of such work to said board. I would have the laboratory, however, given due credit for this work in all reports by the board of health, and to this end it should have an annual or bi-annual report of the laboratory to the Governor of the State, in which all these reports could be incorporated. Furthermore, the laboratory should be free to carry on independent investigations, and should be privileged to publish the results of these investigations in the form of bulletins from the laboratory. It seems to me that a closer affiliation between the public health laboratory at the university and the State Board of Health can be secured if the director of the laboratory were made *ex-officio* a member of the State Board of Health.

The director of the laboratory should have the right in all instances to specify how specimens shall be collected and transmitted, and when specimens are not properly submitted he must be privileged to refuse the examination.

Our present law is defective in several particulars: We are directed to "make bacteriological examinations of body secretions and excretions, waters and foods." With this wording it is difficult to say just how much work we are expected to do, because it includes practically everything of which anyone might wish to have a bacteriological examination made. The result is that we are getting an endless variety of material for examination, and the appropriation is entirely inadequate for the work that we are expected to do. We are at present preparing a bulletin emphasizing the necessity of stopping most of the work that has no direct bearing on the health of the community, such as, for example, the examinations of pathological tissues—work which is in no way connected with the subject of community hygiene. I do not believe that we are quite ready to have the state undertake to pay for every conceivable kind of laboratory examination and analysis.

THE RELATION OF STATE UNIVERSITIES TO PUBLIC HEALTH WORK.*

EDWARD BARTOW,
University of Illinois, Urbana, Ill.

It is my opinion that a very close relation between the State Board of Health and the State University is the ideal relation. In this there are advantages for both parties that neither can afford to miss. The Illinois State Board of Health and the University of Illinois coöperate in tests of water supplies and in the diagnosis of diphtheria; my own experience has been with the former. Under our present arrangement the State Board of Health has the privilege of sending samples of water for analysis. It would be of advantage to both parties if the arrangement could be changed so that the State Board of Health would be more in touch with the analytical work of the university, and if the analytical data obtained could be followed by an investigation conducted by a competent inspector having authority under the State Board of Health.

As has been stated, the State Boards of Health might well make use of the universities, and the universities need the State Boards of Health in order to obtain material for the study of pure food, pure water, social conditions, epidemics, and kindred problems; but they especially need the authority and help of the State Boards of Health to follow up, in a practical way, the results of their experimental work.

The dissatisfaction which sometimes occurs is undoubtedly due to misunderstandings. Too much is expected on both sides. In coöperative relations there should be true coöperation. The officials of the boards and the professors should work as COLLEAGUES, and any other arrangement should be avoided. I have seen, for example, a situation where a professor was treated as a mere analyst. He was supposed to make analyses of material for the inspector of the board and was given no idea of the reason of the work and no knowledge of the use made of the results obtained. A professor cannot afford to spend his time doing such hack work. In fact, if such work were given to a man in private practice, he would undoubtedly turn it over to a paid assistant.

The professor is sometimes expected to do the work without additional cost to the board. It is supposed that because he is already receiving a

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* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

salary from the state for doing one thing, that he can do anything else anyone connected with the state desires, without additional compensation. This is not fair, as the average university professor already has as much educational work as he can carry. To advance in his profession, he must use any additional time he may have in studying or making experiments along lines connected with the subject in which he has become interested, which will help him financially or add to his reputation. Sometimes the professor is not expected to do the hack work, but money is furnished to pay the salary of a man to work under his direction. This is a better situation, yet if the work is something that is not of special interest to the professor he must use a great deal of time in making himself familiar with the subject at hand, and in giving directions to the helper. With such an arrangement, allowance must also be made to relieve the professor of an equivalent amount of university work.

To summarize, the points I wish to make are that the board's officials and the professors should be colleagues, and that the professors should be relieved from part of their university work by employment of helpers who will not only do the board work but the university work relinquished by the professor.

DISCUSSION.

Dr. William F. Snow. I do not believe that the university can do the whole work of the State Board of Health, even if it were desirable to have it do so, and I do not believe the university can ever assume the entire responsibility for an administrative office like that concerned with public health. Consequently I think that the State Board of Health should remain paramount, and so I hold that no legislature should, by legislative action, give any part of the State Board of Health work to the university. In my own state, very fortunately, there is the friendliest coöperation and good feeling between the State University and the State Board of Health. Our hygienic laboratory and our pure food and drug laboratory are located in buildings on the university campus, and manned by university men who are members of the university faculty. The work is going on very well under this regime. The State Board of Health controls the appropriations and is responsible for the work done; the president of the university appoints the directors and assistants. This works well when harmony of purpose exists, but it does not provide against disastrous division of power at any time. I believe, too, that all matters concerning public health should be put in the hands of the State Board of Health, and that the State Board of Health should be held strictly responsible to the people. Then if this board finds it advantageous to arrange with the university for mutually helpful coöperation in any part of its work, such arrangement may be made.

Dr. Henry Albert. A law was passed in Iowa, some six years ago, creating a laboratory which has since worked without friction, as far as the two governing bodies are concerned. The bacteriological laboratory of the State Board of Health is located in the university building, although the university authorities have nothing to do with the funds appropriated for the maintenance of this laboratory, as they are administered by the State Board of Health; nor do the university authorities have anything to say with reference to the scope of the work. This latter question rests with the State Board of Health and is determined by conference between the director of the laboratory and the members of that board. There ought to be certain limitations to the scope of work done in a board of health laboratory. Unless pathological examinations have to do with infectious diseases, I do not believe such examinations come within the scope of board of health laboratory work. This is particularly true,

because there are numerous private laboratories which may properly object to the state board of health laboratories interfering with work of a private nature.

Dr. H. W. Hill. This discussion has brought out the point that absolute incoördination and lack of uniformity exists almost everywhere in the existing relations of state boards of health to universities, and *vice versa;* and I will ask the President to put the motion which has been moved and seconded to the effect that the Association appoint a committee to deal with this whole matter. (Motion referred to the executive committee.)

THE PURIFICATION OF THE WATER SUPPLY OF RICHMOND, VIRGINIA, BY SEDIMENTATION AND COAGULATION, WITHOUT FILTRATION.*

By EDWIN N. EZEKIEL,
Director Settling Basins and Laboratory, Richmond Water Department.

On December 22, 1909, the new water purification plant at Richmond, Virginia, was put into operation,—a plant which is unusual in its construction, and, I believe, of special interest.

The water supply of Richmond formerly came from a canal, which was filled from the James river six miles above the pumping station. This canal received the drainage of several local creeks before it reached the pumps. After rains, the water in the canal was frequently dangerous, and a small outbreak of typhoid fever was traced to it in 1908. The turbidity of the James River (for the last five years averaged 134 parts per million) has been a serious drawback to the city of Richmond. There are long periods when the turbidity does not go over 30, and turbid periods above 50 seldom last over two weeks.

In 1899, an investigation of James River water, and the best method of clearing it without coagulation, was conducted by Dr. E. C. Levy, bacteriologist, now Chief Health Officer of Richmond, and Professor J. W. Mallet, of the University of Virginia, now retired. The prejudice at that time against the use of a coagulant put mechanical filtration out of the question. Slow sand filtration proved to be impracticable with James River water, on account of matter in suspension so fine that it could not be removed without coagulation.

In 1905, Dr. E. C. Levy made experiments on the relative value of iron and lime, and aluminum sulphate in coagulating James River water. He was at no time able to obtain a satisfactory water with iron and lime as the coagulant. The objectionable color of iron was always left in the treated water, unless enough lime were added, not only to convert all the bicarbonates of calcium and magnesium into normal carbonates, but also to leave an actual caustic alkalinity. This statement applies to water treated only by coagulation and sedimentation. In bottle experiments, where coagulation was followed by filtration, Dr. Levy obtained satisfactory results in respect to the absence of the iron color and lack of caustic alka-

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linity, but as Richmond did not wish to install filters, the latter experiment was of no practical use. The average alkalinity for five years has been 40. During periods of turbid water the alkalinity always decreases, the lowest alkalinity ever recorded in the water of the James River at Richmond being 12. It was in consideration of the above mentioned points that Dr. Levy advised the use of aluminum sulphate for the settling basins.

Settling and coagulating basins were recommended; the advantage of the basins lay in the fact that they had an intake directly from the river with local drainage eliminated. Storage basins, sufficiently large to enable closing the intake gates during turbid periods of the river, were also recommended. Improvement in turbidity and bacteria could be expected by plain sedimentation, and when the water was not sufficiently clear, coagulation followed by sedimentation.

Following these recommendations, a purification plant 6100 feet long and of a width varying with the topography of the location was constructed, containing storage and coagulating basins. A dam in the river, at the head of the plant, insured sufficient water to fill the basins. The two storage basins are each one mile in length, and vary in breadth from 30 feet at the head to 400 feet at the lower end, with an average depth of 8½ feet. The capacity of each storage basin is 85,000,000 gallons. The sides of the storage basins are rip-rapped with granite blocks, and have bottoms of impervious clay. The coagulating basins, which have a capacity of about 15,000,000 gallons, or some 2,000,000 gallons more than the average daily water consumption of Richmond, are about 1000 feet long and vary in width from 400 at the broadest point to 50 feet at the outlet gates, with an average depth of 11¼ feet. The coagulating basin's walls and floors are concrete. At the middle wall, between the storage and coagulating basins, is the coagulating plant and laboratory. A reinforced concrete conduit 5,000 feet long and 5 feet inside diameter conducts the water to the pumping station.

The total cost of the settling basins and conduit was about $553,000.00. The plant was designed by and constructed under the supervision of Mr. Charles E. Bolling, formerly Superintendent of Water Works, and now City Engineer of Richmond.

Experiments on sedimentation, previous to the time the basins were put into operation, showed that when water of a turbidity over 300 was stored for a week, it was reduced in bacteria 71 per cent. and in turbidity 90 per cent. James River water of a turbidity below 35 does not give the high percentage reduction in turbidity that will be obtained from a more turbid water. Theoretically, each storage basin holds one week's supply of water. Such experiments as have been made indicate that

water entering the storage basins pushes ahead of it the water in the basins, hence a full week storage is given all water before it is coagulated.

No way of cleaning the storage basins has been provided. In the city reservoirs, which have a capacity of 23,000,000 gallons each, a mud deposit of 440 cubic yards a year occurred until the settling basins were put into operation. Formerly the reservoirs received all river water, however turbid it was. In the storage basins where only the clearer water of the river is admitted, the deposit should be very slight.

The prejudice against coagulating the water had about died out before the settling basins were put into operation. No water has been sent to the pumping station since the first part of 1910 without being first coagulated by aluminum sulphate.

In the coagulating basins, which are operated on the fill and draw plan, seven hours' time is consumed in coagulating and in filling the basin with water; 14 hours is the average time a basin stands and clears, and 21 hours is the average length of time a basin of clear water supplies the pumps.

The water flows into the conduit from the surface of the coagulating basin, leaving the sludge undisturbed on the floor, as the water is not drawn off low enough to disturb it.

The reservoirs into which the water is pumped have a storage capacity of three days, so any matter left in suspension settles in the reservoirs.

The following example illustrates the benefits derived from the settling basins. On July 5th, the river water had a turbidity of 12. The river rose, and five days later the records showed a turbidity of 100 in the river water, and high turbidities in the river were recorded for the remainder of the month. The gates to the storage basins were closed before the turbid water reached Richmond, and a turbidity of 8 was the highest recorded during this period in the storage basins. In the coagulating basins water of a turbidity of 1 was constantly being supplied the pumps. On the day the river had the turbidity of 1000 and a bacterial content of 850 per c. c., the coagulating basins were sending to the pumps water of a turbidity of 1 and an average bacterial count of 1 per c. c.

The various tributaries emptying into the James River above Richmond cause turbidities of the same degree to be entirely different in character, therefore no regular table of grains aluminum sulphate per gallon of water can be used.

Appended to this paper is a table which gives averages for the operation of the basins from January through July of 1910. The average amount of aluminum sulphate for the first seven months of the year has been 1.61 grains per gallon, 2.8 grains per gallon has been the maximum amount any month, and .87 the minimum amount. The average cost,

which includes labor, coagulant, and other operating expenses per million gallons of water for the seven months, has been $4.37. The average turbidity of James River water for the seven months has been 138, for the storage basins 21, and for the coagulating basins 4 parts per million. The per cent. reduction between the raw and stored water was 82—this is obtained by selection as well as sedimentation. A reduction of 79 per cent. was obtained on coagulating storage basin water, and a total reduction for the seven months of 96 per cent. between the raw river water and the effluent from the coagulating basins. The total average bacteria per c. c. in James River water for the first seven months of 1910 was 5170, in the storage basins 1500, and in the coagulating basins 266. Between the raw and stored water there has been an average reduction of 76 per cent., between stored and coagulated water 81 per cent. reduction, and 96 per cent. total reduction in bacteria between the raw water and effluent from the basins. *Bacillus coli* is frequently found in river water in 10 c. c. tests, but seldom occurs in the coagulating basin water in 10 c. c. tests, and practically does not appear at all in 1 c. c. tests.

The sludge that accumulates in the coagulating basins contains aluminum hydroxide which assists in clearing the water. This sludge is not removed until it banks so high as to interfere with the successful operation of the basins. While one coagulating basin is being washed, which process occurs at intervals of about two months, clear water is supplied by continuous coagulation in the other basin. Wash water is pumped from the full coagulating basin then supplying the pumps into the one being washed. Some 2,565,000 gallons remain with the sludge in the coagulating basin after the water to go to the pumping station has been drawn off, and this water is wasted into the river when the basin is to be cleaned. For the washing process 343,000 gallons of water are pumped from the full coagulating basin, so that a total of 2,908,000 gallons are consumed in cleansing a basin. Between washings 445,000,000 gallons are coagulated. The itemized cost of washing a basin in August was as follows:

Labor	$ 62.00
Gasoline for engine	36.25
Machine oil	4.75
Wash water	5.00
Total	$108.00

A calculation on the basis of 445,000,000 gallons of water cleared between washings, and a cost of $108,00 for washing, gives an average cost of 24 cents per million gallons.

Mechanical filtration requires that an average of from 2 to 5 per cent of the total quantity of purified water be used for washing filters. At the settling basins .65 is the total quantity of purified water used for washing a basin.

The data given in this paper apparently indicate that the city of Richmond is now being supplied with clear pure water at a cost for operation, that compares favorably with filtration, and at a much lower cost for washing.

TABLE I.

Operating Results of James River, Storage Basin and Coagulating Basins, Water Purification Plant, Richmond, Virginia.

Month 1910	Average Turbidity			Perc't'ge Reduction Between			Average Bacteria per Cubic Centimeter			Perc't'ge Reduction Between			Aluminum Sulphate Average Grs. per Gal.	Cost per Million Gallons for Water
	River	Storage Basins	Coag. Basins	River and Storage B.	Storage and Coag. Basins	River and Coag. Basins	River	Storage Basins	Coag. Basins	River and Storage B.	Storage B. and Coag. B.	River and Coag. B.		
January...	185	29	8	84	72	95	19276	4765	1291	75	73	93	2.8	$5.49
February.	105	24	3	77	87	97	6825	4616	361	32	92	95	1.7	4.58
March....	74	14	3	81	78	96	3652	554	117	84	78	96	.87	3.05
April.....	102	9	3	91	66	97	2477	136	35	95	74	98	1.12	3.37
May......	41	13	3	68	77	93	366	97	13	73	86	96	1.37	4.19
June......	194	29	4	85	86	98	2681	211	27	92	87	99	1.44	4.89
July......	267	28	3	89	89	98	927	120	21	87	82	97	1.97	5.15
Averages.	138	21	4	82	79	96	5170	1500	266	76	81	96	1.61	4.39

HYPOCHLORITE TREATMENT OF PUBLIC WATER SUPPLIES: ITS ADAPTIBILITY AND LIMITATIONS.*

By GEORGE A. JOHNSON,
New York City.

The use of hypochlorites for sterilization purposes has now reached a stage where its field of usefulness in the destruction of objectionable bacterial life in public water supplies, filtered or unfiltered, is well understood. Until the fall of 1908 the data were scarce and more or less indefinite as regards practical application, but since that time enough history has been made to allow of the statement that a new epoch in the art of water purification has been ushered in—an epoch which is revolutionary in character and which will always remain one of the most striking developments in the art of water purification.

The practical merits of filtration in minimizing water-borne diseases have been widely recognized and accepted for less than twenty years. The writings of antiquity disclose strikingly few references to the filtration of water for the purpose of purifying it and making it safe for human consumption, probably the earliest reference being that which appeared in the "*Ousruta Sanghita*," a collection of medical lore written in Sanskrit probably some 4,000 years ago. In a letter to the British Journal of Preventive Medicine, Mr. Francis E. Place, B. Sc., of Jaipur, Rajputana, India, calls attention to this reference, in which the following appears: "It is good to keep water in copper vessels, to expose it to sunlight and filter through charcoal."

As late as 1892 the efficiency of slow-sand filters was seriously questioned by a large number of medical authorities and engineers. Their arguments against filtration were very largely based upon such occurrences as the outbreak of typhoid fever in that portion of Berlin, Germany, which was supplied with filtered water from the old Stralau works. Many prominent sanitarians did not hesitate to express the conviction that filtration of impure water for municipal use was an ineffective safeguard against water-borne diseases, and altogether improper, and that public water supplies should be drawn only from pure mountain streams and ground waters. The abandonment of filtered Thames River water in favor of water from mountain streams was strongly advocated for London, and the current literature of that day on the subject showed a clear over-balancing tendency against filtration in general.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

In marked contrast to the slow development of the science of water purification up to 1890, or thereabouts, is the remarkable progress in this field of municipal sanitation during the past twenty years. In 1890 less than 200,000 people in this country were being supplied with filtered water, and ninety per cent. of this water came from rapid sand filters which bore little resemblance to filters of this type which have been built during the last ten years. In 1900 the number of people supplied with filtered water had increased to 1,860,000, and in 1904, to 3,160,000. At the present time nearly 8,000,000 people, or over 22 per cent cf the urban population of continental United States, are being supplied with filtered water.

LIMITATIONS OF FILTRATION PROCESSES.

When the first municipal filter was built at London, England, in 1829, the only office it was expected to perform was that of a mechanical strainer in removing turbidity from the water—the germ theory of disease had not then been advanced. It was not until 1849, during the severe cholera epidemic of that year, that this theory assumed definite proportions. With the recognition of the germ theory of disease came the realization that polluted water, when passed through beds of sand, was made safer for human consumption. This, however, as before stated, was not widely recognized, and in the late eighties the art of water filtration for municipalities was on a very insecure basis. The striking results obtained at Altona, Germany, during the cholera epidemic at Hamburg in 1892, did more than anything else to convince the sanitary world, and the general public, that filtration of polluted waters was deserving of the most serious consideration in connection with efforts to minimize the death rate from water-borne diseases. The splendid work of the Altona filters during the Hamburg cholera epidemic is too well known to require repetition here.

About the time of this epidemic, the Massachusetts State Board of Health, as a result of the information accumulated during the early years of the work at Lawrence, arrived at the conclusion that the purification of waters as highly polluted with sewage as those of the Merrimack River could be successfully accomplished at a reasonable cost. Cholera, probably emanating from Hamburg, appeared in New York harbor in the same year, and its appearance caused the city officials of Lawrence to decide upon the construction of a slow sand filtration plant, thereby taking a step which was to prove to be the opening of an era of practical accomplishments in America in the field of water filtration. It must also be pointed out that sand filter plants were built as early as 1874. at Poughkeepsie and at Hudson, New York.

It is probable that the most sanguine advocates of water filtration have never firmly believed that filtration of polluted water, even when carried cut with the greatest care, would at all times render it entirely free of bacteria, or would do more than greatly minimize the danger from drinking it.

The hygienic efficiency of filter plants is usually stated on a basis of the percentage removal of bacterial life from the unfiltered water. Ordinarily such removal amounts to 90 per cent and over, and it is clear that the danger in drinking polluted water is minimized in proportion to the removal of bacterial life. Filters will not remove all bacteria, and probably a fair statement of the safety of a filtered water for drinking purposes would be to say that, other things being equal, it will to a considerable extent vary with the quality of the unfiltered water. In other words, a water which is primarily but slightly polluted will be potentially less dangerous to the public health after filtration than one which is initially foully impure.

Regardless of the initial impurity of a water, efforts have always been directed toward keeping as low as possible at all times the number of bacteria in the filtered water. In Germany the effort has been made to set and maintain a standard of purity for filtered waters of 100 bacteria per cubic centimeter, and when the filtered water contained a higher number than this the filter was to be judged inefficient and was to be shut down and cleaned. The results of the practical operation of large filtration works in this country and abroad show clearly that it is not possible at all times to live up to such a standard as this, and that there will be times in the use of practically all filters when the number of bacteria in the filtered water will amount to several hundred per cubic centimeter.

Filtration of impure waters has undoubtedly been instrumental in reducing by about 75 per cent, on the average, the typhoid death rate in cities in this country using filtered water. It is reasonably certain that there is also brought about by filtration a very material reduction in the death rate due to other diseases than typhoid fever, substantiating the theorem of Hazen.

By filtration, water may be at all times made clear and free from turbidity and color and substantially free from bacterial life. In the last two years the practical adaptability of hypochlorites in rendering practically sterile filtered waters—and unfiltered waters as well—has been clearly demonstrated. The hypochlorite treatment would therefore appear to be a finishing touch in the art of water purification, and would make available an exceedingly economical and harmless means of remov-

ing virtually the last fraction of potential danger from drinking water, whether initially impure or merely under suspicion at times.

HISTORICAL RESUME OF HYPOCHLORITE TREATMENT.

The use of hypochlorites for the destruction of objectionable bacteria in water and in sewage has been a matter of considerable active investigation on a small scale for some twenty years, although it was studied in connection with the deodorization of the London sewage, as reported upon in 1861 by the Royal Commission on Sewage Disposal. The investigators who have studied the action of hypochlorites on bacteria are numerous, and include such well-known workers as Ballner, Barsenge, Clark, Deiter, Dibden, Digby, Dunbar, Elsner, Fermi, Fowler, Gage, Houston, Hunerman, Kaufmann, Kellerman, Kimberly, Konig, Korn, Kranepuhl, Kurpjuweit, Lodi, McGowan, McLintock, Nissen, Phelps, Pratt, Proskauer, Remele, Rideal, Schumacher, Schwartz, Shenton, Sickenberger, Traube, Webster, Woolf, Zirn, and others.

The late Thomas M. Drown observed that the American Public Health Association recognized the value of hypochlorites as early as 1888; and the experience and results obtained at Maidstone, England, in 1897, and at Lincoln, England, in 1904, are too well known to require repetition. The use of hypochlorites at Worthing, England; Middlekerke, Belgium; Nice, France; Poplar, England; Havana, Cuba; Vera Cruz, Mexico; Brewsters, New York; Red Bank and Boonton, New Jersey; Baltimore, Maryland; Union Stock Yards, Chicago, and numerous other places, has supplied valuable information which has in all ways confirmed the earlier favorable ideas of the applicability of these compounds for general sterilizing and deodorizing purposes.

Up to 1908 the use of hypochlorites in the purification of public water supplies had not received serious consideration. Most of the information then available was fragmentary and more or less indefinite in character, and the process had not gained general credence. The first demonstration in this country in a practical way of the usefulness of hypochlorites in connection with water purification was made in the fall of 1908 at the filter plant of the Chicago Stock Yards, on the recommendation and under the direction of the writer. Following directly on the heels of the spectacular results obtained at Chicago, came the adoption of this process for the sterilization at Boonton, New Jersey, of the impounded and unfiltered water supply of Jersey City, with which work the writer was also connected. The results obtained at these two places were given wide publicity, and almost immediately the use of hypochlorites, either intermittently or continuously, spread throughout the United States. Among its users at this

time are many of the largest cities of North America, including Brooklyn and New York; Cincinnati and Columbus, Ohio; Harrisburg, Philadelphia, and Pittsburgh, Pennsylvania; Hartford, Connecticut; Montreal, Quebec; Nashville, Tennessee; and St. Louis, Missouri

THE JERSEY CITY CASE.

Probably the most complete line of information regarding the chemistry of this process was secured during the litigation between Jersey City, New Jersey, and the Jersey City Water Supply Company, which water company, as has been said, was one of the first to make continuous use of hypochlorites as a germicide. After the sterilization plant of the Jersey City Water Supply Company had been in practical operation for several months, during which the quantity of water treated amounted to over 40,000,000 gallons daily, extended testimony was taken in the Court of Chancery before Special Master ex-Chancellor Magie, the testimony being given by Professor H. B. Cornwall of Princeton University; J. A. DeGhuee, New York City; J. W. Ellms, Cincinnati Filtration Works; George W. Fuller, Rudolph Hering and Geo. A. Johnson of New York City; C. E. Garside, New York City; X. H. Goodnough, Boston, Mass.; Professor G. A. Heulett, of Princeton University; N. S. Hill, New York City; Daniel D. Jackson, Brooklyn, N.Y.; Professor Leonard P. Kinnicutt, Worcester Polytechnic Institute; Dr. John L. Leal, Paterson, N. J.; Dr. Ernst J. Lederle, New York City; Dr. George E. McLaughlin, of Christ Hospital, Jersey City, N. J.; Professor William P. Mason, of the Rensselaer Polytechnic Institute; Dr. Charles E. North, of New York City; Professor William H. Park of Bellevue Hospital and New York Research Laboratory; Professor E. B. Phelps, New York City; the late Professor Franklin C. Robinson, of Bowdoin College; Professor Wm. T. Sedgwick, of the Massachusetts Institute of Technology; Professor F. F. Wesbrook of the University of Minnesota; George C. Whipple of New York City; Professor C.-E. A. Winslow of the Massachusetts Institute of Technology; and others.

In his opinion rendered in May, 1910, and based upon the testimony given by the foregoing witnesses, ex-Chancellor Magie made the following statements:

> "From the proofs taken before me, of the constant observations of the effect of this device, I am of the opinion and find that it is an effective process which destroys in the water the germs, the presence of which is deemed to indicate danger, including the pathogenic germs, so that the water after this treatment attains a purity much beyond that attained in water supplies of other municipalities. The reduction and practical elimination of such germs from the water was shown to be substantially continuous."

"Upon the proofs before me, I also find that the solution described leaves no deleterious substances in the water. It does produce a slight increase of hardness, but the increase is so slight as in my judgment to be negligible."

"I do therefore find and report that this device is capable of rendering the water delivered to Jersey City pure and wholesome, for the purposes for which it is intended and is effective in removing from the water those dangerous germs which were deemed by the decree to possibly exist therein at certain times."

DESCRIPTION OF THE CHEMICAL, AND NATURE OF THE PROCESS.

Much has already been written about the chemistry of the process of hypochlorite treatment in the sterilization of water, but it may be that a condensed statement in this connection may not now be out of place.

Hypochlorite of lime, commercially known as "chloride of lime" or "bleaching powder," has been, and is, extensively used for bleaching purposes in paper mills and in many textile industries. It is sold in the form of a dry white powder and is usually shipped in wooden or sheet-iron containers of a capacity ranging from 100 to 750 pounds each. It is manufactured at numerous places in this country, as well as abroad, and its cost in large quantities is about one and one-third cents per pound at the works. When exposed to air the powder deteriorates in strength rather rapidly, because of the absorption of moisture and carbonic acid. It is usually bought on the basis of its strength in so-called "available chlorine." The product in this country usually runs about 35 per cent pure, according to this standard.

When the hypochlorite in the powder form is dissolved in water containing carbonic acid, hypochlorous acid is liberated. This acid is a powerful oxidizing agent, and in the presence of organic matter gives up oxygen in an atomic state with an amount of energy which makes this chemical approach ozone in intensity of action as an oxidizing and sterilizing agent. It is generally considered to be superior to ozone for practical purposes, for the reason that it is more easily applied and brought into speedy and thorough contact with all parts of the water to be treated, which appears not now possible in the case of ozone. There seems to be no doubt, also, that it always is materially cheaper than ozone.

The chemical itself, as bought, is a mixed salt which consists of approximately equal amounts of calcium chloride and calcium hypochlorite. When the powder is added to water the calcium chloride remains inert, but the calcium hypochlorite, being acted upon by the free and half-bound carbonic acid in the water, splits up into calcium carbonate and hypochlorous acid. The decomposition of the exceedingly unstable hypochlorous acid liberates oxygen in a very active state and leaves hydrochloric acid. The latter then drives off the weaker carbonic acid and

unites with the calcium, forming calcium chloride. It is the liberation of oxygen in this manner that effects by oxidation the destruction of bacterial life.

The general result following the application of hypochlorite of lime to water is the destruction of the majority cf the non-spore-bearing forms of bacterial life which the water may contain, a reduction in the organic color of the water, an oxidation of the organic matter proportional to the amount of the chemical applied, and a slight increase in the total hardness and total solid matter of the water. Where quantities no greater than from five to fifteen pounds of the powder are applied to each million gallons of water, as is the common practice, the changes in the physical and chemical characteristics of the water before and after treatment are so slight as to be barely noticeable and are well within the limits of accuracy of the prevailing methods of analysis. The important result and greatest change is the virtual destruction of the bacterial life in the water, more particularly the disease-producing germs. Included in this group are the germs of Asiatic cholera and typhoid fever.

HYPOCHLORITE OF SODA.

There is another method of obtaining hypochlorites, and that is through the electrolysis of solutions of common table salt, whereby hypochlorite of soda is produced. Careful study of the relative efficiency of hypochlorite of lime obtained from bleaching powder, and hypochlorite of soda electrolytically produced from common table salt, shows that, unit for unit, hypochlorite of soda is slightly more efficient in the destruction of bacterial life than hypochlorite of lime. The process of manufacture of hypochlorite of soda is not so well understood from a chemical standpoint, however, but it appears certain that where electric current can be obtained for one and one-half cents or less per kilowatt hour, and salt for one-third of a cent per pound, or less, hypochlorite of soda will prove to be a cheaper germicidal agent than hypochlorite of lime. Furthermore, in some cases its use may be preferable to that of hypochlorite of lime, because of the aesthetic objections sometimes raised against the use of bleaching powder, which, in the case of the electrolytic solution, should be entirely overcome. It is understood that at the water purification works of the city of Cincinnnti, preparations are now being made for the installation of electrolytic cells in which hypochlorite of soda will be manufactured and substituted for the hypochlorite of lime used in the past.

It has been asserted by some that free chlorine is liberated from the bleaching powder as applied to water and that it may persist for some time in water so treated. In this connection it may be said that the term

"available chlorine" is a convenient term used by the analyst to express the strength of the bleaching powder or the electrolytically prepared solution of hypochlorite of soda. This term was adopted by industrial chemists for the reason that in bleaching operations at some places the commercial product is treated with strong acids which can break up the chemical and release free chlorine. It is perfectly clear that if free chlorine could be released from bleaching powder when applied to water, such free chlorine would immediately combine with the hydrogen of the water and form hydrochloric acid, and at the same time liberate free oxygen in an atomic state. The final result, therefore, would be the same.

ABSENCE OF POISONOUS FEATURES.

There is plenty of evidence of a conclusive character to show that the weak carbonic acid, as found in natural waters, is incapable of releasing appreciable or even measureable quantities of free chlorine from bleachimg powder. Instead of this, hypochlorous acid is produced—and hypochloous acid is not a poison. Upon its decomposition with organic matter, the chlorine which the hypochlorous acid contains combines with the alkalinity of the water and forms calcium chloride. By present laboratory methods no free chlorine is found in the application of this chemical to an ordinary water supply. In the past, efforts have been made by those who did not favor the process to locate a toxicologist who would classify this treatment as a poisonous one, but such efforts have been unavailing.

In the Jersey City case, Professor G. A. Heulett testified that in his examination of the Jersey City water to which had been added ten pounds per million gallons of bleaching powder, he was unable to determine the presence of free chlorine. It is a fact that there has been no chemical test yet devised which is capable of identifying the presence of free chlorine in an alkaline solution such as normal surface water. Professor Heulett stated, however, basing his assumption upon the theory of electrolytic dissociation and giving all possible benefit of the doubt to the plaintiff in the case, that if ten pounds of bleaching powder per million gallons were added to the Jersey water, it was theoretically possible for free chlorine to the extent of 6.4 parts in a trillion parts of water to be present in the water after treatment. He admitted that he was unable to prove this assumption. It was furthermore pointed out in this case that if Professor Heulett's theory was correct, in order for an adult to obtain a medicinal dose of free chlorine, such as has been administered in cases of typhoid fever as an anti-ferment and germicide, it would be necessary for such a person to drink a gallon of water so treated each day for 7,180 years.

PREPARATIONS OF HYPOCHLORITE SOLUTIONS.

It is the more common practice to make up hypochlorite solutions of one-half per cent strength, that is, one pound of the bleaching powder to 200 pounds of water. It is probable that solutions as strong as four or five per cent may be made without material loss of oxidizing power, but the more dilute the solutions are, the more easy they are to work with, because of the deposits of quicklime formed in orifices and in pipes. It is well to point out that where electrolytically-produced solutions of hypochlorite of soda are used, no trouble is had on account of deposits of sludge, as is the case with hypochlorite of lime. This is another feature of no little importance in favor of the use of hypochlorite of soda.

Concrete appears to be the most suitable material for solution tanks. Iron tanks may be used, but they are attacked by the chemical and eventually eaten through, although they last a long time owing to the protection afforded by deposits of lime upon the exposed surfaces. Black iron pipes have lasted for over two years at the Boonton plant and at a number of places special bronze pumps have worn well. Wooden tanks are the least suitable of all, but if wood is used cypress seems to be the best material. White pine is reduced to pulp in a comparatively short space of time.

When solutions of bleaching powder are used, it is essential that the contents of the tank be thoroughly stirred at the outset, in order to get into solution all of the soluble portion of the powder. Later on, stirring is convenient to keep the sludge well distributed; for if not stirred, it becomes troublesome as the last portion of the solution is removed from the tank. Tanks ten or twelve feet deep, containing a one-half per cent solution of bleaching powder, or hypochlorite of lime, will ordinarily show a deposit of lime sludge about one inch thick, which contains about as much of the active agent as the one-half per cent solution does. Care should therefore be taken in its disposal, otherwise it will cause trouble to fish in water into which it is emptied.

Solutions deteriorate but little when standing in covered tanks that are constantly stirred—perhaps some two per cent in a day or two.

Considerable attention has very recently been given to the feasibility of applying the bleaching powder in dry form. If appliances can be devised that will allow of the addition to water of a suitable quantity uniformly at all times, more or less automatically, there is no reason to suppose that hypochlorite applied in the form of powder will not act as satisfactorily as in the form of a solution, provided there are afforded adequate facilities for complete mixing of the dry powder with the water to which it is applied. Hypochlorite of lime absorbs moisture rapidly, and

this is probably a difficulty which will be hardest to overcome where the application is in the dry form, as with time the powder will tend to lump and grow pasty.

PERIOD OF CONTACT.

All available data indicate clearly that the germicidal action of hypochlorites is exceedingly rapid. This is due, of course, to the fact that atomic oxygen is released promptly when the chemical is applied to the water.

As a general proposition it is thought advisable to provide for a contact period of at least one hour before the treated water is delivered to the consumer. In some cases even shorter periods have given satisfactory results. Such periods of contact in some cases are provided by long pipe lines or distributing reservoirs between the point of application of the hypochlorites and the nearest consumer. It is also highly important that the chemical be quickly and thoroughly mixed with the water, a process which is usually effected by mechanical stirrers or baffling arrangements.

AMOUNT OF CHEMICAL TO BE USED, AND BEST POINT OF APPPLICATION.

The best point of application of hypochlorite to a water depends largely upon the conditions surrounding each individual problem. As a general proposition, as before stated, from five to fifteen pounds of the powder per million gallons of water are required to effect practical sterilization of filtered or unfiltered waters which contain normal amounts of organic matter. If the water contains abnormal amounts of organic matter, or iron in an incompletely oxidized state, considerably larger quantities of the germicide are required to obtain the best results. Each individual problem must be studied by itself and the correct dose of the germicide ascertained in the beginning.

The earliest studies with hypochlorites were directed at the total elimination of bacterial life, but this is not now considered necessary in the sterilization of water. The principal object is to destroy all disease-producing germs, such as those of typhoid fever, if such germs are present. This can be done without effecting the complete destruction of all bacterial life in the water, for the reason that the typhoid bacillus, as well as the colon bacillus, is less hardy than most forms of bacterial life which naturally predominate in water and which are known to be non-pathogenic. Their removal, therefore, is not a matter of consequence as regards the sanitary quality of the water. It is known that hypochlorite has a selective action upon such germs as the bacillus of typhoid fever and *B. coli*,

and owing to their less resistant state in water it destroys them more quickly and completely than it does some of the harmless forms of bacteria common to water. It is not unusual to find that such bacteria as resist the hypochlorite treatment are spore formers and other hardy forms of non-pathogenic water bacteria.

To determine the amount of hypochlorite to be added to a given water, the latter must first be carefully studied in connection with the germicidal treatment, and the quantity of the chemical which gives satisfactory results under normal conditions ascertained as nearly as possible. When this amount is found, it is the common practice to increase this quantity some 25 per cent. in order to guard against sudden fluctuations in the quality of the untreated water which may increase its power of absorption of the hypochlorite. Where the germicide is added to a filtered water, such fluctuations are much less marked.

PRECAUTIONS AGAINST UNDER-DOSING AND OVER-DOSING.

It is obvious that if too little of the germicide is used there may be an unwarranted feeling of security, for the reason that for months the results may be thoroughly satisfactory with the application of a given quantity of chemical, and then, owing to a sudden change in the character of the water, unsatisfactory results may be obtained. For this reason it is always better constantly to use more of the chemical than is actually required under normal conditions.

On the other hand, over-dosing is quite as undesirable. If the attempt is made to effect complete sterilization of the water rather than to secure the destruction of the pathogenic bacteria, there is a strong probability that at times there will be imparted to the water an undesirable taste or odor which has been variously considered by laymen to be similar to carbolic acid or iodoform. It is not believed that, within working limits, the presence of an excess of this chemical in water is deleterious to health, but it is objectionable to the senses and is therefore inadmissible. There is no excuse for such over-dosing, for when the quantity of chemical required under normal conditions is once ascertained, by making use of a moderate amount over this quantity a sufficient margin of safety has been provided to meet ordinary conditions.

ADVANTAGES OF THE PROCESS.

Reciting the practical status of the use of hypochlorites in connection with the purification of water, it may be stated that the advantages of the process are the following:

1. Substantially complete destruction of objectionable bacteria, particularly those of intestinal origin.

2. Reliability and ease of application of the chemical, together with small variation in the required dose.

3. Total absence of poisonous features, either in the chemical product, as applied to the water, or in any of its resulting decomposition products.

4. Merely nominal cost of the chemical and its application.

5. Speed of reaction, making unnecessary any substantial arrangements as to basins other than storage facilities.

6. Substantial saving in the cost of coagulation of waters that are of sufficiently unsatisfactory appearance to require clarification or filtration.

7. Rates of filtration materially in excess of those possible where high bacterial efficiency is required of the filtration process in the absence of sterilization.

8. Reduced clogging of the filter beds with a consequent lengthening of the runs between cleanings, due to the destruction of various forms of algae.

LIMITATIONS OF THE PROCESS.

In making a complete analysis of the practicability of this process, it is necessary to recognize the fact that it is not possible by the use of this germicide to overcome certain disadvantages, such as the following, which do not appear in connection with certain styles of water treatment:

1. Inability to remove or destroy all of the spore-forming bacteria not considered to be pathogenic to man, at least not those common to water.

2. Inability to remove bacteria which are embedded in particles of suspended matter.

3. Inability to remove turbidity.

4. Inability to remove appreciable amounts of color or dissolved vegetable stain.

5. Inability appreciably to remove organic matter.

6. Inability to remove swamp tastes or odors.

7. Inability to remove creosote tastes or odors coming from the cleaning of stills used in the destructive distillation of wood.

8. Inability to soften water; as a matter of fact, the addition of hypochlorite of lime usually results in a slight increase in the hardness of the water—although this is not ordinarily measureable—notwithstand-

ing the fact that the commercial product usually contains a little free quick lime which reduces slightly the carbonic acid in the water.

9. Difficulties encountered in applying this process, except with the greatest care, to waters which contain substantial quantities of reducing agents or compounds capable of oxidation, such as nitrites and unoxidized iron.

The foregoing statements set forth the advantages and short-comings of this process which, like other things that are new, is likely to be, and in some cases is, considered a cure-all for all water ills, no doubt with disappointing results in some cases.

The application of hypochlorite to water, while comparatively simple, should always be carried out with much care and fidelity by a competent analyst; otherwise if the dose is not adjusted so as to meet satisfactorily all local conditions, there is liable to be alternately an overdose of the chemical insufficient to sterilize, or an overdose which will result in objectionable tastes and odors readily noticeable to the consumers, and due to the bleach itself.

The use of hypochlorites cannot be considered in the light of a substitute for filtration. Where waters are uniformly satisfactory in appearance, but open to suspicion as regards their content in bacteria, the use of the hypochlorite process alone in many cases may prove sufficient. Where waters are unsatisfactory in physical appearance and are also polluted and require filtration, the combined use of filters and the hypochlorite process is called for. As an adjunct to filtration processes it has a distinct field of applicability, as above stated, for at a moderate cost it is feasible to obtain a water which is practically above suspicion; and, furthermore, there is brought about a substantial economy in the first cost of the filtration plant. This is made possible by the use of higher rates of filtration than are ordinarily used, and the required filter area may therefore be reduced. It also effects a substantial economy in the cost of operation.

Laboratory Section

PRELIMINARY REPORT OF THE COMMITTEE ON STANDARD METHODS OF SHELL-FISH EXAMINATION.*

The committee has held four meetings during the year,† and carried on considerable correspondence, but deems it inadvisable to present a final report at this time. During the coming year a large number of examinations of shell-fish are to be made by members of the committee and by others, and the results ought to be of great value in supplying data concerning some of the important questions that have arisen, particularly those relating to the efficiency of methods of testing for bacteria of the *Bacillus coli* type and the significance of the results obtained by their use.

Pending a final report a year from this time, we suggest the following tentative program to those undertaking sanitary shell-fish examinations, with the further suggestion that they communicate their results to the secretary of the committee.

The following may be considered as the main divisions of laboratory work in connection with sanitary shell-fish examination: The collection, transportation and examination from a chemical and bacteriological standpoint of samples from

A. Shell-fish in the shell (shell stock).
B. Opened shell-fish (shucked stock).

TENTATIVE METHOD OF PROCEDURE FOR SHELL STOCK.

SELECTION OF SAMPLE.

In the case of oysters, it is recommended that twelve (12) oysters of the average size of the lot examined, with deep bowls, short lips, and shells tightly closed, be picked out by hand and prepared for transportation to the laboratory. In the case of other shell-fish, those of average size and in good condition should be selected.

TRANSPORTATION OF SAMPLES.

The oysters (or other shell-fish) should be packed in suitable metal or pasteboard containers of such size and shape that a number of them can be enclosed in a shipping case, capable of satisfactory refrigeration by means of ice. The important points in this connection are:

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.
† 1910.

A. The prevention of the mixing of shell-fish liquor between different samples, and of the mixing of the ice water with the shell-fish.

B. The icing of the samples, if they are not to arrive at the point of laboratory examination inside of thirty-six hours or if the outside temperature is above 50° F.

It is not necessary to enclose the shell-fish in an absolutely tight container, providing the above conditions are maintained.

Condition of Samples.

Note should be taken of the general condition of the shell-fish when received, especially whether the shells are open or closed; of the presence of abnormal odors; and of the temperature of the stock.

Technical Procedure.

The shell-fish should be thoroughly cleaned with a stiff brush and clean running water, and then dried. The edges of the shell should be passed through the flame or burned with alcohol. In the case of oysters, the opening of the shell-fish may be accomplished by either of two methods:

A. By the use of a sterile oyster knife in the usual manner.

B. By drilling through a flamed portion of the shell near the hinge with a sterile drill. It would be well to sterilize both the drill and shell side at least once during the drilling process.

The former method is generally used.

Bacterial Counts.

Bacterial counts should be made, using agar made in accordance with the methods recommended by the Committee on Standard Methods of Water Analysis, and incubating at 37° C. for 24 hours and at 20° C. for three days, using measured quantities (1.0; 0.1; 0.01 cc., etc.) of shell water of each of five shell-fish.

The committee is not as yet prepared to express an opinion as to the value of the results of bacterial counts in the sanitary shell-fish examinations of shell stock, but suggests that reports upon such examinations would be of great value in arriving at a conclusion on this point.

Determination of Bacteria of the *Bacillus Coli* Type.

The committee is not now prepared to make final recommendation concerning special procedures for qualitative and quantitative determination for this group of organisms, and until such a recommendation is made, it advises that the methods used conform as far as possible to the standard methods used for water analysis. The following is suggested as giving satisfactory results.

A. Quantitative determination of the presence of *B. coli* in measured quantities (1.0; 0.1; 0.01 cc., etc.) of the shell water of each of five shell-fish selected from the dozen, by the inoculation of fermentation tubes containing some one of the various liquid media recommended for presumptive tests for *B. coli*, and the incubation of the same for three days at 37° C., with daily observations of the percentage of gas formed.

It is thought that the use of lactose bile in such tubes, either as the primary fermentation test or as secondary to fermentation tests started in liver broth, has given more satisfactory results than any other liquid culture media. The suggestion is also made that when the "liver-broth-lactose-bile-method" is followed, the technique described by D. D. Jackson and his associates be adhered to so far as possible. Attention is called to the fact that if liver broth is used as a preliminary culture medium, its period of incubation must not exceed 18 hours, and preferably should be less than this.

The use of liquid media in fermentation tubes may be supplemented by tests with solid media as outlined below, the special object being to obtain colonies of bacteria of the *B. coli* type, if present, during the first 24 hours, thus allowing a prompt confirmation of their morphological and biological characteristics.

B. Determination of *B. coli* or allied forms through the sowing of measured quantities (1.0; 0.1; 0.01 cc., etc.) of shell water of each of five shell-fish on solid culture media of special composition for the development and differentiation of *B. coli*, such as lactose bile salt, esculin bile salt, Endo's, malic acid, malachite green or MacConkey's agars, etc.

TENTATIVE METHOD OF PROCEDURE FOR SHUCKED STOCK.

Selection of Sample.

After thoroughly mixing the stock in the container from which the sample is to be taken, one or more wide mouthed sterile jars, of the total capacity of approximately two quarts, should be filled by means of a clean ladle, or other instrument, sterilized by flaming alcohol. This jar or jars should be so sealed as to exclude all possibility of contamination from without.

Transportation of Sample.

When the time between the collection of the sample and its examination exceeds three hours, or if the outside temperature is above 50° F., the sample should be thoroughly refrigerated by means of ice.

TECHNICAL PROCEDURES.

The bacteriological examination should not be made until twenty-four hours has elapsed from the taking of the samples. In the meantime the jars should remain unopened and refrigerated.

The methods of chemical analysis will be considered in a subsequent report.

BACTERIAL COUNTS.

Same as for shell stock.

DETERMINATION OF BACTERIA OF THE *Bacillus Coli* TYPE.

Same as for shell stock, with the exception of the use of higher dilutions than 1-100th cc. and the making of triplicate tubes from each dilution.

STATEMENT OF RESULTS.

The committee wishes to state emphatically that the results of bacteriological examinations should not be used as the sole basis for the interpretation of the sanitary quality of shell-fish. The results of the sanitary survey in all cases should be considered of at least equal importance. We are not prepared to give expression of opinion at this time to any definite numerical relation between the various factors involved in the bacteriological results, nor in the sanitary survey, but expect that with the additional information to be available during the coming year, it will be possible to express these relations with some definiteness by means of the score card system. Looking forward to such a system, the committee suggests that in the case of shell stock the results of bacteriological examinations for *B. coli* be expressed by the following arbitrary numerical system, to be known as "The American Public Health Association Method of Scoring Oysters for *B. coli*:—"

The presence of *B. coli* in each oyster of the five examined is to be given the following values, which represent the reciprocals of the greatest dilutions in which the test for *B. coli* is positive:

If present in 1.0 cc. but not in 0.1 cc., the value of 1.
If present in 0.1 cc. but not in 0.01 cc., the value of 10
If present in 0.01 cc. but not in 0.001 cc., the value of 100, etc.

The addition of these values for the five oysters would give the total numerical value for the sample and this figure would be the score for *B. coli*.

The results should be expressed in the following tabular form:

RESULTS OF TESTS FOR *B. COLI* IN DILUTIONS INDICATED.

Oysters	1.0 cc.	0.1 cc.	0.01 cc	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	0	0	1
4	+	0	0	1
5	+	0	0	1
	Total, or score for *B. coli*			23

+Presence of *B. coli* group in fermentation tube test with lactose bile where subsequent isolation tests have confirmed the results of the presumptive test or other satisfactory test.
0 Failure to demonstrate presence of *B. coli* group.

It will be seen that if the *B. coli* score is divided by 5, the standard number of oysters tested, the results will approximate the number of *B. coli* per cubic centimeter of shell water. Partly because it does not do this exactly, but also for simplicity and the avoidance of fractions, the method of stating results as an arbitrary "score" is preferred by the committee. Practical experience with the method has also appeared to justify this conclusion. If some other number of oysters than five is tested, the results can be reduced to this score by following the same method and applying the rule of three to the total numerical value.

Sometimes results similar to the following are obtained; that is, one or more oysters may show positive results in small quantities of shell water, while an equal number may show negative results in larger quantities. In this case the next lower numerical value should be given to the positive results in the high dilutions, and such positive results should be considered as being transferred to a lower dilution giving negative results in another oyster. This is done in order to avoid the unnatural result that could follow from what is probably an unequal distribution of the bacteria in the shell water. This recession of numerical values, however, should not be carried beyond the point where the number of such recessions is greater than the number of instances where other oysters in the series failed to give positive *B. coli* results.

As examples of the method of obtaining the score for *B. coli*, the following illustrations are given. They represent results that may be met with in practice.

CASE A.—RESULTS OF *B. COLI* TESTS IN DILUTIONS INDICATED.

Oysters	1.0 cc.	0.1 cc.	0.01 cc.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	0	10
4	+	0	0	10
5	+	+	+	10
			Score	50

CASE B.—RESULTS OF *B. COLI* TESTS IN DILUTIONS INDICATED.

Oysters	1.0 cc.	0.1 cc.	0.01 cc.	Numerical Value
1	+	+	+	10
2	+	+	+	10
3	+	0	0	1
4	0	0	0	1
5	0	0	0	1
				Score, 23

CASE C.—RESULTS OF *B. COLI* TESTS IN DILUTIONS INDICATED.

Oysters	1.0 cc.	0.1 cc.	0.01 cc.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	+	100
4	+	+	+	10
5	+	0	0	10
				Score, 140

The committee also suggests that the results of bacteriological examinations in the case of shucked stock be expressed by a similar numerical system, but that only three portions be tested.

The following tabulations illustrates the method as applied to shucked stock.

RESULTS OF *B. COLI* TESTS FOR DILUTIONS INDICATED.

Inoculations	1.0 cc.	0.1 cc.	0.01 cc.	0.001 cc.	0.0001 cc.	Numerical Value
1	+	+	+	+	0	1000
2	+	+	+	0	0	100
3	+	+	+	0	0	100
						Score, 1200

RESULTS OF *B. COLI* TESTS FOR DILUTIONS INDICATED.

Inoculations	1.0 cc.	0.1 cc.	0.01 cc.	0.001 cc.	0.0001 cc.	Numerical Value
1	+	+	+	+	+	1000
2	+	+	+	0	0	1000
3	+	+	+	0	0	100
						Score, 2100

It is thought unwise to assign any sanitary significance to particular scores for *B. coli* until the committee has secured more data than it now possesses. It is hoped that enough information may be obtained before another year to make this possible.

In conclusion, your committee wishes to express its appreciation of the kind assistance of many of the members of the American Public Health Association, and wishes also to commend the attitude which the oyster growers of the country are gradually coming to assume in regard to the sanitary questions involved in their business, an attitude of co-operation with health authorities, instead of one of hostility.

Respectfully submitted,

George C. Whipple, *Chairman.*
A. W. Freeman.
Stephen De M. Gage.
William Royal Stokes.
H. D. Pease, *Secretary.*

PRACTICAL TESTS OF CERTAIN FACTORS IN STATE WORK AFFECTING THE ACCURACY OF DIPHTHERIA CULTURE DIAGNOSIS.*

By A. J. CHESLEY, M. D.
Laboratory Division of the Minnesota State Board of Health.

Previous to April 22, 1910, the Laboratory Division of the Minnesota State Board of Health was compelled to submit to the excessive charges and unnecessary delay in delivery of diphtheria outfits by express, because the postal regulation limiting the size and capacity of the serum tube, practically prohibited the mailing of outfits containing serum culture media.

Our experiments with many different styles of mailing outfits containing swabs alone, indicated that their use in routine state work would sacrifice accuracy in bacterial diagnosis. Indeed, Minnesota's experience with swab specimens had led to printing in heavy type on the back of every diphtheria report dating from 1896: "A NEGATIVE DIAGNOSIS IS NEVER MADE ON A SPECIMEN SENT IN ANY OTHER WAY THAN ON FRESH CULTURE MEDIUM."

The Boston Board of Health laboratory staff, after testing the longevity of diphtheria bacilli on swabs, concluded† that laboratory inoculation of serum from swabs forwarded by physicians would give more accurate results in state work than the present method of bedside inoculation. These tests did not cover all the points which necessarily affect routine work in Minnesota, and work was at once begun here to determine whether the efficiency of the laboratory service could be increased by such use of swabs alone. In order to include all factors, and the influence of their variations, such as time in transit, locality, technique, temperature, humidity, personal equation, day of disease, clinical character of cases, etc., in a large way and thereby insure practical reliability in our deductions from the results, our work was planned in three parts.

The work of the first and second parts outlined in this paper extended from November 15, 1909, to May 1, 1910. Ordinary routine specimens were used without selection. Altogether 1270 swabs were tested; these were taken from 874 patients by 302 physicians and forwarded by express, mail or messenger, from 165 different localities in Minnesota. From each of these swabs a bedside and a laboratory culture were sown and the results compared. Of the 874 cases, the laboratory reported 417 positive,

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

† Am. Jour. Pub. Hygiene, Vol. 5, p. 324.

429 negative, and on 28 reserved opinion, requesting other specimens which were, however, not forwarded.

The personal equation within the laboratory was eliminated as far as possible, the work having been done by three bacteriologists.* Neither the character of the case nor the reason for the examination was known to the examiner before the microscopic diagnosis had been recorded. The number of different physicians (302) taking the swabs would seem to cover the average range of influence due to the personal equation element on the part of the clinician.

The number of specimens (1270) and of patients (874) would seem to allow for the variation in clinical character of cases, amount of membrane or exudate and similar factors, the influence of antiseptic or other local treatment.

The different localities represented (165) would seem to include whatever variation there may be in local conditions likely to affect the viability or morphology of diphtheria bacilli.

The hours which elapsed between bedside and laboratory inoculation vary sufficiently to cover the extremes met with in state work in Minnesota. All conditions peculiar to the usual modes of transit, (express, mail, and messenger,) were encountered.

To determine accurately the influence of temperature and humidity, it would be necessary to follow every specimen from patient to laboratory—an obvious impossibility; therefore, we recognize and accept as inevitable that considerable variation of temperature not necessarily related to the weather must occur in state work. The variations in temperature and humidity, as shown by the reports of the U. S. Weather Bureau, appear to have exceeded the averages for the months concerned. These reports are quoted briefly as a basis for speculation upon the influence of temperature and precipitation which occurred in Minnesota while this work was being done.

A variation in laboratory technique was planned for each part of the work to give every opportunity for detecting the diphtheria bacilli.

The great majority of specimens included in our experiments were from cases which had many previous or subsequent examinations. These afford a good check on case diagnosis. A comparison of the physician's case diagnosis with the laboratory case diagnosis, based upon the examination of more than one specimen from each case, shows the following interesting points which strongly indicate that our work covered the average of state routine:

* Miss Phebe Pearsall, Dr. O. McDaniel, and the writer.

First; 30 cases, diagnosed by the physician as clinical diphtheria; would have been quarantined when diphtheria bacilli were not the cause of the sore throats.

Second; 20 cases, diagnosed by the physician as suspected diphtheria; might have been subjected to unnecessary quarantine had no microscopic examination for diphtheria bacilli been made.

Third; 10 diphtheria convalescents, judged upon clinical opinion alone, would have been released from quarantine with virulent organisms present in their throats.

Fourth; Among the 874 individuals examined were 11 carriers, or about 1.25% who never had clinical symptoms. This percentage approximates the conservative estimate for diphtheria carriers among well persons.

The first part of our work is a comparison of the microscopic findings on serum inoculated at the bedside by the physician with those on serum inoculated in the laboratory from the same swabs. The swabs* were returned to the swab tubes after each inoculation and before incubation. A platinum loop was used in making the microscopic preparations. This technique was used for 635 swabs taken from 440 patients by 187 physicians in 118 localities.

The second part of our work is similar as to the comparison of results, but the swabs were left during incubation upon the serum inoculated by the laboratory workers. The microscopic preparations were made by rubbing the swabs over the surface of the serum and employing them instead of the loop in making the smears. This techinque was used for 635 swabs taken from 434 patients by 190 physicians in 116 localities.

The results of the two techniques correspond so closely that a separate analysis of each is not necessary. The table given affords opportunity for detailed observation and comparison.

NO ATTEMPT HAS BEEN MADE TO INCLUDE IN THIS PAPER THE ANALYSIS OF SUCH RESULTS—813 SWABS—AS WERE UNIFORM IN BOTH BEDSIDE AND LABORATORY CULTURES.

Altogether nearly 36% (457) of the total number of 1270 laboratory cultures failed to check with those previously inoculated at the bedside from the same swabs. These 457 swabs were taken from 318 patients by 175 physicians, and were forwarded from 114 different localities in Minnesota,—407 by express, 29 by mail, and 21 by messenger. The number of hours between bedside and laboratory inoculation of the same swabs, herein designated as time in transit, varied from 2 to 171† hours,

* Wooden applicators are used in Minnesota state work.

† One specimen, carelessly overlooked by the express agent, was forwarded from Brainerd, Minnesota, via Seattle, Washington.

although 443 were received within 84 hours; and the date and hour of bedside inoculation of six specimens were unknown. No data were available for calculating the day of disease on which 74 specimens were taken, but 360 specimens were taken on or before the 38th day and 23 later than the 38th day.

Nearly 95% of the discrepancy was apparently due to changes which occurred in the swabs after application to the throats and before inoculation in the laboratory. Unsatisfactory growth, however, caused 54% of all the discrepancy. This resulted from the failure of the physician to use the swab as directed and FROM LOSS OF MOISTURE DURING TRANSIT. The faulty technique of the clinician, as a matter of fact, lowers the efficiency of the immediate bedside inoculation method about three per cent.

Extreme carelessness on the part of physicians is clearly shown by observations in nine swabs excluded from this analysis which gave no growth in either the bedside serum or on later inoculation of another serum in the laboratory. Thirty original serums gave no growth, because they were not inoculated by the physician at the bedside; the swabs received with them yielded satisfactory growth upon inoculation of the laboratory serum. Later each of these original serums was sown in the laboratory from the swab sent by the physician and developed a growth, which proves that it had not been inoculated at the bedside.

Far more accurate results were obtained by the present serum method of immediate bedside inoculation than by the proposed swab method of deferred laboratory inoculation.

Of the 457 specimens which indicated results on laboratory inoculation different from that of bedside inoculation, 203 were sent for bacterial diagnosis from 193 cases, with clinical diagnosis as follows. "Diphtheria" 93, "Suspicious" 45, "Exposed" 16, and "No disease" 39. Most of the diagnosis specimens were taken on or before the seventh day of the disease. The remaining 254 specimens, sent for release from quarantine, were from 121 clinical cases and from 4 suspicious cases. The release specimens were distributed from the 6th to the 41st day of the disease, except a very few taken later.

Classifying the 227 bedside serum positives according to hours in transit, the deteriorating influence of time and dessication is shown, since of 75 swabs received within the first 24 hours after bedside inoculation only 17 (22%) showed even suspicious bacilli upon laboratory inoculation; of 100 received in the second 24 hours only 17 (17)% showed even suspicious bacilli; of 37 received in the third 24 hours only 6 (16%) showed even sus-

picious bacilli, and of 15 received later than 72 hours only 1 (6%) showed even suspicious bacilli.

The positive granular types of diphtheria bacilli were found in these 227 bedside cultures, while the 41 (18%) laboratory cultures classed as suspicious displayed only barred or solid types; 109 (48%) showed no diphtheria-like bacilli; and in 77 (34%) no bacteriological diagnosis could be given on account of unsatisfactory growth.

The analysis and tabulation of this work was very thorough and laborious. Every factor concerned was carefully studied to determine accurately its influence, but on account of the expense of publication, complete tables, covering 21 typewritten pages are omitted* and only the headings are outlined to show the extent of the investigation.

Table "A" recorded the serial number of the specimens, the day of disease when taken, whether taken for diagnosis or release, how transmitted to the laboratory,—by express, mail or messenger—the exact number of hours in transit. Under the heading, "microscopic findings on serum inoculated at bedside and in the laboratory," were given the types of diphtheria bacilli and the associated organisms, and under the heading, "case diagnosis," the physician's and the laboratory diagnosis.

In "Table B" the specimens sent for diagnosis and for release in each part of the work were enumerated separately in twelve-hour groups, according to the time taken in transit, on the basis of the diagnosis given from microscopic findings, as follows:—Positive; Negative; Reserved on account of (a) suspicious bacilli (b) scant or no growth (c) dry serum (d) serum liquified by spore bacilli or pasty growth.

The physician's case diagnosis (Positive, Suspicious, Exposed, No Disease) with the laboratory case diagnosis (Positive, Suspicious, Reserved, Negative), was also shown in Table "B".

In Table "C" a comparison of the respective case diagnoses of physician and laboratory† was made, the specimens for diagnosis and release of the first and second techniques being enumerated under the headings "Both Positive"; "Both Negative"; "Both Reserved"; "Phy. Positive, Lab. Negative"; "Phy. Positive, Lab. Suspicious"; "Phy. Negative, Lab. Positive"; "Phy. Negative, Lab. Suspicious"; "Phy. Suspicious, Lab. Positive"; "Phy. Suspicious, Lab. Negative"; "Phy. Exposed, Lab. Positive"; "Phy. Exposed, Lab. Suspicious"; "Phy. Exposed, Lab. Negative"; "Phy. No Disease, Lab. Positive"; "Phy. No Disease, Lab. Negative"; "Phy. No Disease, Lab. Suspicious."

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* By permission of Dr. F. F. Wesbrook, Director of the Laboratory Division.
† Based upon findings of bedside cultures.

Table "D" enumerated the diagnosis and release specimens of each of the two parts of the work under the day of disease on which the swabs were taken.

Table "E" enumerated the diagnosis and release specimens of each part according to the number of hours which elapsed between bedside inoculation and laboratory inoculation of the same swabs, .i. e., 1-12 hours, 12-24 hours, etc.

Table "F" is given in full (p. 589), since it shows just how the 457 laboratory inoculations differed from the bedside inoculations of the same swabs.

This work demonstrates the following facts:

95% of the total error was due to the *swab method.*

2½% of the total error was due to the physician's faulty technique.

2½% of the total error was due to uncontrollable factors, such as the development of bacteria resulting in pasty growth or liquefaction of serum, the use, contrary to printed directions, of worthless culture outfits in which the serum was completely dried, the physician's occasional neglect to swab the throat after he had filled out the data blank, and errors in bacterial diagnosis, which must be almost *nil* under the excessive precautions taken in this work.

To compare in absolute figures the accuracy of the two methods, let each specimen count as one point. Then the proposed swab method of deferred laboratory inoculation has to its credit 842 points, or 64% of accuracy in results.

813 (results alike by both methods).
9 (positive by *swab*, negative by *bedside method*).
20 (20 to 30 bedside serums showing no growth*).

against 1231, or 97% of accuracy in results, for the present *serum method* of immediate bedside inoculation.

1270 less 39 (9 specimens negative by *bedside*, positive by *swab method*).
(30 specimens no growth by *bedside*, satisfactory by *swab method*).

Certain factors should be considered in connection with this investigation. The range of temperature over which the viability of diphtheria bacilli extends is known from experiments with pure cultures, and the extremes of temperature likely to be encountered under the usual conditions of culture transportation fall well within this range. Our results fully bear this out.

Drying tests, which diphtheria bacilli in pure culture have survived, show a rather small downward range of humidity; although throat swabs

* Assuming that the same proportion of these laboratory inoculations was correct as of the whole number, i. e., 813 in 1270, or about two-thirds.

kept for a long time in cotton-plugged tubes without exposure to sunlight have given good growth of diphtheria bacilli. As a rule, swab tubes are plugged tightly and not exposed to sunlight during transit. Assuming that our swabs were dipped in the water of condensation during the inoculation of the bedside culture, they may have retained more moisture after the drying during transit than would swabs moistened only by swabbing throats and used for sowing serum after reaching the laboratory. Assuming also that some part of the infectious material gathered by throat swabbing is deposited on the bedside serum, there may have been remaining on our swabs less throat material for the second inoculation than would remain on swabs first applied to serum in the laboratory; however, the throat material on our swabs would have been unaffected, except that the vitality of the organisms may have been conserved during transit by the additional moisture and nutrient medium acquired by the swab when rubbed over the moist serum at the bedside.

We conclude from the data presented that high temperature tends to increase error only as it promotes drying of the swabs, and that the chief cause of error is not the variation of temperature encountered in transit, but the LOSS OF MOISTURE FROM THE SWABS.

The third part of the work was planned to be a test of the relative efficiency of bedside and laboratory inoculation of swabs, exactly comparable in every particular. It was deferred until our new mailing outfits for diphtheria specimens could be distributed throughout the state.

Two tubes of serum for separate nose and throat bedside inoculation, and two tubes, each containing two swabs, are to comprise the outfit. The physician will inoculate the serum, by the use of separate swabs for nose and throat, leaving the swabs in the serum tubes. The other two swabs, after application to the nose and throat, are to be sent back to the laboratory, in separate tubes labelled "nose" and "throat," to be used there to inoculate serum which will be incubated and examined at the same time as the bedside serums. The results from 1000 such specimens should be sufficient finally to decide this question of bedside vs. laboratory inoculation of swabs in routine state work.

TABLE F.

SHOWING HOW THE 457 LABORATORY INOCULATIONS DIFFERED FROM THE BEDSIDE INOCULATIONS OF THE SAME SWABS.

Bedside Inoculations		Same swabs inoculated in laboratory.				
Diagnosis on Microscopic findings.		Positive	Negative	Reserved on account of		
				Susp. bacilli	No growth	Spore bacilli
Total positive, 227						
Technique No. 1....	114		61	14	38	1
Technique No. 2....	113		48	27	29	9
Total negative, 182						
Technique No. 1....	93	5		6	81	1
Technique No. 2....	89	4		1	76	8
Total reserved, 48						
Technique No. 1....	31					
Techinque No. 2....	17					
(a) Susp. Bac., 13						
Technique No. 1....	4	2			2	
Technique No. 2....	9	2	4		3	
(b) No growth, 30						
Techinque No. 1....	25	2	21	2		
Technique No. 2....	5	2	3			
(c) Serum spoiled, 5						
Technique No. 1....	2		2			
Technique No. 2....	3		3			
	457	17	142	50	229	19

227 swabs showing granular types of *B. diphtheriae* on bedside inoculation gave different results on deferred laboratory inoculation, as follows:

109 showed no diphtheria-like bacilli.
77 showed unsatisfactory growth.
41 showed suspicious bacilli (barred and solid types only).

182 swabs showing no diphtheria bacilli on bedside inoculation gave different results on deferred laboratory inoculation, as follows:

9 showed granular types of *B. diphtheriae*.
166 showed unsatisfactory growth.
7 showed suspicious bacilli (barred and solid types only).

EXTRACTS FROM REPORTS OF U. S. WEATHER BUREAU.

Report for November, 1909:

"In Minnesota the mean temperatures ranged from a little above 38° to somewhat less than 28°. Unusually cold periods extended from the 15th to the 18th, and from the 22nd to the 23rd. The 18th was generally the coldest day.

"The precipitation ranged from nearly 8 inches to a little more than one-fourth of an inch. The bulk of the precipitation fell between the 13th and the 16th. There was an unusually heavy fall of snow in the western counties on the 14th, and over the greater portion of the State on the 16th. The monthly snowfall was unusually heavy ranging from about 3 inches in the central counties to 30 inches in the south, and to 20 inches in the north."

Report for December, 1909:

"Warm weather prevailed from the 1st to the 5th, followed by steady cold weather the rest of the month. The 1st was generally the warmest day and the 29th the coldest. The highest temperature recorded was 58° on the 2d, and the lowest 39° below zero, on the 9th.

"The precipitation was the heaviest on record with the single exception of December, 1902. The average for the past month was 1.52 inches. Quite general rains fell on the first 4 days, followed by general and heavy snowfall on the 5th. General and more or less heavy snows fell on the 11th, 16th, 20th and 27th. The snowfall was unusually heavy. The ground was covered from the 5th to the end of the month to a depth of 5 to 15 inches."

Report for January, 1910.

"The month was considerably warmer than usual in Minnesota, although an unusually cold period extended from the 3d to the 10th. The first 2 or 3 days were moderate but after the 3d a cold wave spread over the section, and markedly low temperatures prevailed until the 10th; zero temperatures were recorded on several days, and ranged from —2° to —17° on the 6th and 7th. After the 15th the weather moderated somewhat, with several bright and pleasant days during the third and fourth weeks, but the maximum temperature was below 50°, except on a few days.

"The average precipitation was slightly above the normal, but there was a deficiency in northern Minnesota. More or less general storms occurred on the 5th, 17th, 20th and 26th. The snowfall ranged from 1 to 15 inches, and the ground was covered with snow throughout the month from 5 to 20 inches in depth."

Report for February, 1910:

"There was a deficiency of temperature of 3° to 5° per day, the mean for the month being 6.2° lower than in February, 1909, and 5:2° warmer than the coldest February, that of 1904. The deficiency of temperature was general. An unusually cold period extended from the 15th to the 25th.

"The precipitation ranged from one-tenth of an inch, or less, to over an inch in a wide belt extending across the center of the State from Bigstone, Traverse, and Chippewa counties to Lake Superior. The deficiency of precipitation was general, except within this belt. The heaviest storm of the month occurred on the 15th. The snowfall was unusually light, but a very unusual depth of old snow remained on the ground throughout the month."

REPORT FOR MARCH, 1910.

"In Minnesota the month was remarkably warm, dry, and sunshiny. In fact, it was by far the warmest, driest, and clearest March on record. The mean temperature ranged from about 44° in the southern counties, to about 36° on the international boundary. The excess in temperature ranged from 14° in the east, to 18° above the normal in the western part of the State. The 23d was the warmest day, and the coldest days occurred between the 7th and 9th. The temperatures on the 23d were the highest ever recorded in the State in March as shown by various records, extending back 10 to 88 years.

"The precipitation was practically inappreciable over the southern half of the State, and was below the normal in all but the extreme northwestern corner, where some of the monthly amounts were in excess of an inch. The greatest 24-hour precipitation occurred generally on the 29th and 30th. On those dates there were thunderstorms, confined mainly to the western and northern counties."

REPORT FOR APRIL, 1910.

"The month was much warmer than usual in Minnesota. Unusually warm periods occurred on the 9th and 10th and on the 27th and 28th. On the last date a maximum of 95° was recorded at Winnebago and Lynd No. 2, which is the highest temperature ever recorded in the State during the month of April. Cold periods occurred on the 16th and 17th and from the 22d to the 25th, with severe freezing temperatures, greatly damaging vegetation, which had prematurely advanced during the warm weather of March and the first half of April.

"The precipitation was generally below the normal, but an excess occurred in portions of Minnesota. The precipitation ranged from a little more than one-half inch to more than 4.00 inches. There was an excess of precipitation in most of the western and northern counties, and a deficiency in the eastern and southern counties. Most of the monthly precipitation occurred from the 14th to the 18th, but there was quite general precipitation on the 4th and 22d. On the 16th and 17th there was a general and heavy fall of snow. The average monthly snowfall was 4.5 inches."

Section on Vital Statistics

REPORT OF THE COMMITTEE ON UNIFORM TABLES FOR STATISTICAL REPORTS AND BULLETINS.*

The committee appointed to co-operate with a corresponding committee of the American Statistical Association and with the Bureau of the Census, begs leave to submit the accompanying memorandum on uniform tables as its report of progress, with the request that such of the specific recommendations as may seem advisable be adopted as rules of statistical practice.

The co-operating committee of the American Statistical Association, through its Chairman, Professor Walter F. Willcox, presents a draft of a report of that Association, with forms of tables, which is incorporated in this report, subject to any amendments or alterations that may be made, prior to its adoption, by the American Statistical Association.

There is also appended to this report a circular letter issued by the Bureau of the Census, and it is urged that the report be published, if feasible, perhaps as a census pamphlet, as a basis upon which definitive recommendations and forms of tables may be presented for adoption at the next session of the Association.

The problems involved are so far-reaching and difficult in their practical solution that it would seem necessary to proceed slowly and cautiously rather than to exhibit undue haste in the formulation of proposed forms.

Respectfully submitted,

WM. C. WOODWARD,
MARSHALL LANGTON PRICE,
CHAS. A. HODGETTS,
F. L. WATKINS,

Committee.

* Read before the Section on Vital Statistics of the American Public Health Association, Milwaukee, September, 1910.

REPORT OF THE COMMITTEE OF THE AMERICAN STATISTICAL ASSOCIATION.

The undersigned members of a committee appointed at the last annual meeting of this Association to co-operate with a committee of the American Public Health Association to consider forms of tables employed in registration reports, federal, state, and municipal, and to draft a set of standard tables, have the honor to submit the following report of progress:

The form of statistical tables is dependent primarily upon the information which the tables are to convey; that information always consists in certain statistical totals correlated in various ways. In American registration reports, as a class, the space given to tables regarding deaths greatly exceeds that given to all other tables combined. For this reason the present report is confined to mortality tables.

American registration of deaths in nearly all cases is now based upon a standard certificate. Hence the information open to tabulation is practically identical. Part of the information conveyed on a certificate is merely for identification or corroboration and has no statistical value. This is true regarding the decedent's name and that of the father and mother, the date of birth as distinguished from the age, the length of residence, the place and date of burial, and the name and address of the undertaker. After excluding these items, there remain for use in statistical tabulation the following:

(1) Place of death,
(2) Time of death,
as physical characteristics of the decedent.
(3) Sex.
(4) Age.
(5) Race or color.
(6) Birthplace.
(7) Birthplace of father.
(8) Birthplace of mother.
(9) The cause of death,
as social or economic characteristics of the decedent.
(10) Marital condition.
(11) Occupation.

The cases or deaths are thus susceptible of classification under each of these heads, and each possible combination of them, and the living population as reported by a census or as estimated for other than census years, may be similarly classified. The proper classification of deaths is the primary object of all mortality tables in registration reports, the presentation of ratios between the annual deaths in a certain group, and the enumerated or estimated living population in that group is the secondary object.

The classification of deaths should run parallel with, and not extend beyond, that of the living population. For example, there would be little or no use in so classifying deaths as to ascertain the deaths of natives whose mothers were born abroad, so long as the corresponding class in the living population is unknown.

Tabulations with reference to a single characteristic seldom, if ever, have much scientific or practical value. Thus to know the number of females who died in 1910 or the number of persons who died of tuberculosis is of little importance. But when

the persons dying of tuberculosis are classified by sex, age, and occupation, and the living population is classified in the same way, and the ratios or rates computed, the results become significant. There is little use, then, in tabulating separately for each of the eleven characteristics previously mentioned; the tables should merely show various combinations of these eleven characteristics. These combinations may be dual-like sex and nativity; triple-like sex, age, and occupation; quadruple-like sex, age, occupation, and cause of death; and so on.

The problem of the forms of tables in registration reports is in no slight degree a mechanical one, inseparably connected with the size of the printed page, the amount of space, and of money available for the work, etc. Answers to problems of this sort must be left to the authorities whose official duty it is to deal with them. The particular aspect of this problem with which a committee of private students can properly deal, is with reference to the best correlations of statistical data to be incorporated in those tables. If a list of desirable correlations, arranged in the order of their importance, could be made out, the work of the committee might be deemed properly completed.

In drawing up such a list, it is possible either to start with the present procedure and attempt to systematize it, or to disregard that experience and start afresh. Your committee believes that the former is the proper method and has therefore inquired; What correlations of statistical data are now presented? To secure an answer to this question the latest available registration reports of every registration state and of ten registration cities, selected on the basis of size and location, have been examined. New York and South Dakota were disregarded, because of the almost complete absence of classification of deaths in their reports. The District of Columbia is treated as a state rather than as a city. In this way a total of sixteen registration states is found; of these sixteen the number which tabulate the several items is as follows:

Item	Number of registration states in which it is tabulated.
Place of death	16
Cause of death	14
Sex	7
Age	7
Time of death (month)	6
Birthplace (native or foreign born)	4
Race or color	2
Nativity of parents	1
Marital condition	1
Occupation	1

The number of possible correlations of two items in a series of eleven, by a simple mathematical formula is found to be fifty-five. Of these fifty-five possible correlations, the following are those found most commonly in the sixteen registration states:

Correlation	Number of registration states in which it is tabulated.
Cause and place of death	13
Sex and cause of death	10
Sex and place of death	10
Age and cause of death	10
Time and cause of death	9
Sex and age	8
Place of death and nativity	7
Age and place of death	7
Place of death and color	5

Of the fifty-five possible correlations of two items, nine are found in at least five states, eleven are found in from one to four states, and thirty-five are not found in any state. As examples of possible classifications of deaths not now made in any registration state, the following may be mentioned: A classification by sex and occupation, by sex and marital condition, by age and nativity, by occupation and race.

An examination of the tabulations made in the health reports of the ten selected cities does not show any significant difference between the state and the city forms.

Your committee recommends, then, that all states and cities not now giving this information be urged, if possible, so to modify their tables as to include in them such dual classifications as are already furnished by more than one-third of the registration states—namely:

Sex and age	Place and cause
Place and sex	Cause and sex
Place and age	Cause and age
Place and nativity	Cause and time

The committee also recommends that all states and cities having more than ten per cent. of negroes in their population tabulate also by place and color.

In a series of eleven items the number of possible correlations by threes is 165, or three times the possible number of two correlations; the number of possible correlations of four items is 330. But the labor and cost of tabulating by threes and by fours are far greater than those required for two items. It is not surprising, therefore, to find, that while of the fifty-five possible correlations by twos, twenty, or thirty-six per cent., are found in at least one state; of the one hundred and sixty-five possible correlations of three items only twenty-five, or fifteen per cent., are found in at least ode state, and of the three hundred and thirty possible correlations of four items only ten, or three per cent., are found in even one state, and only one is found in two states. Having in mind this omission of complicated tabulation by American states and cities at the present time, and also the difficulty and cost of introducing them, your committee does not recommend any material extension of the work of municipal and state departments into these now unoccupied fields. It suggests, indeed, that these fields are just the ones in which the Federal government, acting through the Bureau of the Census, may best aid city and state health work by preparing such complicated and expensive tables for the registration area and its leading divisions.

To make its recommendations more specific and thus, perhaps, more helpful, it submits the following drafts of tables:

Table 1 gives the population of each division of the state or city for the last two censuses and the population for the year in question, as estimated by whatever method has been adopted as the best.

Table 2 gives the deaths for each state or city and recognized subdivision by sex, by time (month of death), and by age.

Table 2 thus gives the correlation of place and sex, place and time, place and age, or three of the eight correlations recommended by your committee.

Table 3 would be a brief table having in the stub the same age classes as appear in the box heads of Table 2 and in the box heads simply "Total Male—Female." This affords the correlation for age and sex.

Table 4 would give the correlation of place and nativity, and, if that were desired, place and color. Where the proportion of negroes was so slight as to make the correlation of place and color unimportant, the distinction between native and foreign

born is so significant that it might be wise to correlate place with nativity of parents. This would give two forms of the table with identical stubs, but with varying box heads, as shown below:

TABLE 4—Deaths Classified by nativity and parent nativity.

Deaths classified by nativity.

Place of death	Native				Foreign Born
	Total	Total	Of Native Parentage	Of Foreign Born Parentage	

TABLE 4a—Deaths Classified by Nativity and Color.

Deaths classified by

Place of death	Nativity			Color		Other
	Total	Native	Foreign Born	White	Negro	

Table 5 would give the cause of death in the stub, and in the box heads the sex classification and the counties or tracts into which the reporting area was divided. This table would thus present the other two correlations, cause and sex, and the cause and place, as indicated below:

TABLE 5—Deaths Classified by Sex and Cause of Death for Counties (or Tracts).

Deaths Classified by

Cause of Death	Sex			County of death					
	Total	Male	Female	A	B	C	D	E	F

The preceding five tables include all of the correlations of two items now presented in any five of the registration states and thus may be regarded as a sort of codification of prevailing practice in American states and cities.

Regarding the municipal areas to be accepted as units for tabulation, your committee reports that the frequent and important changes in the boundaries of municipal voting districts like wards and precincts, the absence of any other legal divisions of permanence and importance, and the great difficulties in the way of tabulating by blocks, have led the Census Bureau in a few of the largest cities to define permanent artificial areas of about forty acres to be used for tabulating purposes and to contemplate a gradual extension of this system. Your committee invites the attention of municipal registrars to this plan and suggests that these areas be carefully considered for purposes also of local tabulation.

MEMORANDA ON UNIFORM TABLES FOR VITAL STATISTICS.

1. It is more expedient to discuss the general question of securing uniformity and to agree upon some general principles than it is to adopt at this time any actual forms of standard tables.

2. Standard tables should be considered with reference to their appropriateness for, first, the census reports; second, state reports and bulletins; third, city reports and bulletins.

3. Census reports should deal primarily with states and large cities, giving only the fundamental data for small cities and counties. They should deal with data in the mass, for broad comparisons chiefly, and to establish standards (e. g., corrected rates, general life tables) with which local comparisons can be made.

4. State reports should begin where the census reports leave off, and study the state as a unit; and they should give special attention to counties and groups of counties (e. g., see Bulletins of Indiana, Michigan, and New York), and should present data in considerable detail for small cities and villages, singly and grouped into cities of from 5,000 to 10,000 population, etc. They may even take up the individual towns or townships when such units are important, but they should not go into the subdivisions of large cities that maintain an efficient registration service.

5. City reports, especially those of large cities, should deal with the primary units of area (city blocks) grouped into such larger aggregates (wards or sanitary districts) as may be found advisable, and they should specialize on morbidity statistics and their relation to mortality statistics.

6. Whatever mortality statistics are worth printing at all are, as a rule, worth printing with full details of sex, age, and color (when colored population is ten or more per cent.) This refers to the primary tables.

7. "Unknowns" should never be "distributed" but should appear as a criterion of registrative efficiency for sex, age, color, and all other items.

8. Important general tables, and especially those for causes of death, should show ages, by sex, for each quinquennial period from 0-4 to 95-99. The first quinquennial period should be subdivided into single years. A detailed list of centenarians should be given, and for infant mortality the first year of life should be stated by months, the first month by weeks, and the first week should show at least the first five days individually. For tables of occupations the periods should be: 10-14, 15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over, with special statement for children under ten years, when child workers under that age are found.

9. All main tables of causes of death in reports of states and large cities should use the detailed International Classification without change or alteration, except that SUBDIVISIONS (but not additions or changes) of titles may be made when necessary. For minor tables the exact abridged International Classification should be used in the same way, and for special purposes shorter selected lists may be made, each title representing certain definite titles of the detailed International Classification. Each title should bear its International Classification number to assure ease of comparison and certainty in regard to the inclusion of terms.

10. For the following diseases tables should be presented by calendar months and by the regular series of age periods until less than five per cent. may be embraced in the final period:

Typhoid fever	Tuberculosis
Malarial fever	Bronchitis
Measles	Pneumonia
Scarlet fever	Diarrhea and enteritis
Whooping cough	By months, weeks, and days of age.
Diphtheria and croup	Congenital debility, etc.
Influenza	By months, weeks, and days of age.

11. Causes of death with death rates should be presented for each year since the beginning of registration, if practicable according to the abridged International Classification, otherwise according to the list in the International Table of the Registrar-General's Report.

12. The first general tables constructed should provide for the data contained in the main tables of the International statistics of the "*Statistique Generale*" of France.

13. Every report should contain a table showing the dates and population, by sex and ages, at several recent censuses.

14. Every report should contain a table showing the elements of population, by sex, age, color, nativity, etc., at the last census.

CIRCULAR LETTER OF THE BUREAU OF CENSUS.

Dear Sir: One of the most important questions that concerns all who make and use vital statistics reports and bulletins is: How shall the data be presented in the most serviceable and readily comparable form?

The solution of this problem requires co-operation. A special committee of the American Public Health Association's Section on Vital Statistics (Dr. W. C. Woodward, Washington, D. C., Chairman) and a co-operating committee of the American Statistical Association (Prof. Walter F. Willcox, Ithaca, N. Y., Chairman) are co-operating with the Bureau of the Census for the purpose of preparing uniform standard tables for the presentation of vital statistics.

All reports on vital statistics—national, state, and municipal—should be thoroughly co-ordinated, so that unnecessary duplication of work can be avoided and desired data can be readily found in comparable form.

With reference to the last census report I should like to ask:

(1) Whether it fairly meets requirements for such a publication? If not, in what respects is it chiefly lacking?

(2) What tables could be omitted without material loss? Why?

(3) What tables should be added?

(4) What tables should be changed in form in order to be of greater use?

(5) Other suggestions or criticisms.

The time is now at hand for beginning the Annual Mortality Reports of the Census Bureau for a new decade—1910–1919—and we are in a position to secure action along uniform lines for co-ordinating the national, state, and city reports so that each may come to recognize more clearly its own field of special usefulness. I shall appreciate the greatest frankness and shall take pleasure in submitting all suggestions to the co-operating committees, who join me in this request.

Very respectfully,

Cressy L. Wilbur, M. D., Chief Statistician.

Notes and Reviews*

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Director of the Board of Health Laboratory, Boston, Mass.
(*Reviewer.*)

†**Abolition of the Common Towel in Kansas.** By a ruling of the State Board of Health the use of the common roller towel in hotels, railway stations, and in public and private schools is prohibited from and after September 1, 1911. The term "common towel" is construed to mean roller towels and towels intended or available for common use by more than one person without being laundered after such use.

Recent Health Measures in Michigan. Under the orders of the Secretary of the State Board of Health of Michigan: (a) An exhibition health train will be run through the southern section of Michigan during the first half of August, 1911. This train will be equipped with a large collection of charts and models, and demonstrations will be made. (b) A pamphlet has been prepared to be used by the teachers in the public schools as an instruction manual in making physical examination of children, with especial reference to defective conditions of the eyes, ears, nose, teeth, mouth and throat. (c) On and after July 20, 1911, the resolution forbidding the use of a common drinking cup in railroad trains, steamships, depots and schools, will be enforced. (d) An expert in the study of eugenics will be employed to make a careful study along that line. (e) A permanent educational committee is to be appointed to plan, arrange and hold sanitary institutes, and to engage lecturer in the interests of preventive medicine. It is planned to hold ten state sanitary conventions at various points during the coming winter. (f) A weekly bulletin is to be published by the secretary. (g) Provision is to be made for a medical inspector to work in association with the Dairy and Food Department in the investigation of water, milk, and other food supplies.

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

† Bulletin of the Kansas State Board of Health, June, 1911.

Resignation of the Secretary of the Ohio State Board of Health. Dr. Probst, for twenty-five years Secretary of the Ohio State Board of Health, has recently tendered his resignation. In an interview given to the "Columbus Dispatch," he gives his reasons as follows: "After mature consideration I have decided to resign as Secretary * * * * because under the present regime I am no longer permitted to direct the work along lines that seem to me of most importance and for the best interests of the state. Furthermore, the recent action of the board in re-electing me its secretary for a term of one year, a thing that was never done before and which is not contemplated under the law, makes the term of office so uncertain that no executive officer, even if unhampered, could count on carrying out broad and definite policies requiring time, which is absolutely essential in public health work. I shall therefore retire and devote my entire time to the practice of medicine."

BOOK REVIEWS.

Proceedings of the American Association of Medical Milk Commissions. Fourth Annual Session, 1910. 266 pages. $1.00. Office of the Secretary, Otto P. Geier, M. D., 124 Garfield Place, Cincinnati, Ohio.

This book contains a very valuable collection of addresses with discussions on the subject of clean milk. Mr. Stephen Francisco, first producer of certified milk in this country, presents a paper on certified milk in a most interesting and instructive manner and the subsequent discussion brings out many of the practical difficulties encountered in certified milk production. Another paper from the dairyman's point of view, by Professor Stocking, of Cornell, is a careful scientific presentation of certified milk problems. The bacteriology of milk and the influences affecting it are gone over from the point of view of the dairy and the laboratory. The relation of bovine to human tuberculosis, especially as it has to do with the transmission of the disease through milk, is summarized in a very clear and concise address. A most interesting statement of the history and development of the milk charities of the United States shows the detailed workings of all these associations and their relation to other charitable organizations in the cities in which they are situated, and their relations to one another and to medical milk commissions.

At the end of the book there is appended a manual of the working methods and standards of medical milk commissions to serve as a basis and guide for commissions. This manual presents the combined experience of all the important medical milk commissions in the United States. It shows the legal status of certified milk work and states the methods of inspection for farms and the standards which should be required. It also lays down standards for the chemical and bacteriological examination of milk.

Altogether it is a very interesting and concise presentation of the subject of clean milk. This book will prove interesting to laymen and to physicians in general, especially to those interested in the clean milk problem. It will be indispensable for members of the medical milk commissions and those working in other organizations intending to improve the quality of the milk supply. RICHARD M. SMITH.

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SPECIAL ARTICLE

HOW TO GET AND KEEP COMPETENT HEALTH OFFICERS.

By GEO. W. GOLER, M. D.,
Health Officer, Rochester, N. Y.

THE half has not been told about the health officer, and what has been said is not true. The problem in relation to the health officer can be pithily put in the characterization of the Scotchman who said, when speaking of his countryman: "You canna tell wha' you can do wi a Scotchman a' you catch him yung." So it is with the health officer—you cannot tell what you may make of him if you catch him young, not more than from five to seven years out of the medical school, and preferably less than thirty years of age. The trouble with the present health officer is that he is not prepared for his position; he just falls into it, and he never knows quite how long he is going to stay.

In approaching the problem of the selection of a health officer, it must be conceded that he must be drawn from the ranks of the medical profession, and that he must be a physician with special training in sanitation and hygiene. It is his duty to teach people about the preservation of health, and the prevention of disease. What training for such a career

has he had in the medical schools with their limited curricula of courses in sanitation and hygiene? The great profession of medicine, in the past, based its teachings, and still bases them, on the old principle of the cure of disease; while the new profession of medicine, the profession of medicine that we hope for, the one that will get a new grip upon the thinking men and women who make the opinions of the world, will have to recast some of the methods of the old medicine, and recast its teachings into a new form which will emphasize the prevention of disease.

The men taught in the older schools of medicine still think about the sick; the men taught in the schools to be will think about the well. All the schools of medicine that have sought to acquire leadership in the healing art have based their teachings upon those of Hippocrates, Galen, and their followers, and out of superstition, witchcraft, and medieval soothsaying, have sought the cure of disease. All the succeeding practices, from botanic medicine to osteopathy and Eddyism, have been but protests against the therapeutics of the schools. But while the medical schools still retain much of the old therapeutics, and their teaching is still concerned with the healing of the sick, out of the teaching of the schools and among the men so taught, you will have to find your health officer and train him—and you will have to catch him young.

What qualities, then, are desirable in the health officer? Not only must he be a man of robust physique, with a body the ready servant of the will, but he must have the ability to teach the truths of the new medicine. His knowledge of that science must be firmly grounded upon the fundamental principles of physics, chemistry, and biology, and also upon the interrelation between the life processes of the simple forms of plant and animal life, and the higher life—the life of man. He must not only comprehend these truths, but he must be able to teach them to individuals and to groups. He must know not only the history of his own department of knowledge, but he must know the history of civilization. He must have what the Germans call *Erdkunde*. "He must know the earth, what is in it, on it, around it." He must know, too, the history of man,—how he has passed from the simple life of hunter, fisher and herder, to the complex life, and from field and farm to factory and office, so that he may teach people that as they change their modes of living and go from the country to the cities, new modes of living become necessary and new practices absolutely essential to health.

To the health officer the solution of problems relating to ventilation, water supply, plumbing, drainage, sewerage, the removal of wastes, ashes, garbage and rubbish, the removal of dust, the prevention of noise, provision for housing, prevention of congestion, the production, transportation,

and preparation of food, the principles of diagnosis, the prevention of disease, the systematic collection and interpretation of the data pertaining to causes of death—of which we know little—and the gathering together of accurate knowledge concerning the causes of sickness—of which we know less—these, and many other associated problems, must all be his for solution. He must early recognize that there is an old sanitation as well as an old medicine, and that in the old sanitation there are objects of fetich worship, such as sewer gas, disinfection, and quarantine, with other analogies, anachronisms, and superstitions, that must disappear and give place to newer, more modern, less harmful, less expensive and less restrictive practices, based on the newer teachings of the great masters of modern hygiene and sanitary science.

One of the chief criticisms of the present, directed at the health officer as well as at the health office, is that both he and it have no simple, concrete program of public health to present to the medical profession and to the people. One health officer says to the profession and the public: "Pasteurize all milk." Another says: "Away with pasteurization, it's a fraud." One says: "All the persons in the house with a case of contagious disease must be absolutely quarantined." Another says: "All quarantines are folly." One says: "Disinfect after every contagious disease." Another says: "Disinfection is a survival of the practice of the middle ages." One says: "All plumbing must be tested by the peppermint or smoke test; all houses must have their plumbing trapped, and all traps must be ventilated through the roof and at the sidewalk." Another says: "All but fixture traps are unnecessary, and back vents are but devices of the plumber to sell pipe. Better back vent your children's noses and throat's, and let the plumbing alone."

Just as long as we have such widely divergent views as these, neither the profession nor the public will have much respect for the health officer. The health officer must, therefore, be among those who will help to make a program of public health that will appeal alike to the modern sanitarian, the medical profession, and the public; not a program that will help only to settle those questions of sanitation already referred to, but a program that will also deal clearly and concisely with the questions of preventive medicine as they relate to the child, the care of the expectant mother, the uncared for gap in childhood from birth to the time the child enters school, the institution and conduct of that kind of medical inspection of schools and school nursing that will have to do with the orderly examination and record of the different phases of the physical development of the child. In dealing with the child the health officer must be able to form concepts of what might come to pass in a new order of hygiene and sanitation,

when as much attention will be given to the health and life of the child as we now give to the preservation of the life and health of plants and animals. He must be able to see and provide means so that, under a better condition of health administration, the birth of a child will be safe from the perils that now surround it; he must see clearly and provide means for preventing the menace of gonorrheal blindness at the very threshold of the world; he must see the relation of clean food to the digestive tract; he must view clearly the early dangers of adenoids, and even small tonsils, to health and growth; he must know thoroughly the dangers of infectious diseases to the orderly growth of the organs of the child's body, and their influence on the development of the teeth, the organs of sight and hearing, and their determining causes in lowering weight and stature at given age periods; he must sense with clear vision and sharp insight the relation of children, one to another, in the school and at play, follow the budding sex development, and turn the thought of the child into proper channels as soon as it begins to inquire into the origin of being, and so follow it through the various paths of development, teaching, guarding, directing, and protecting the growth of the child until it becomes a man or a woman.

When you come to select a health officer, consider the problems both sanitary and hygienic that are crying out for solution. Ask the candidates for the position what appears to them to be the principal problems of the city, and their scheme for solving them. Ask each candidate to write an essay discussing these questions and to give his plan of solving them in detail, with the mode of administration and the cost involved. In other words, every applicant should be asked to include in an essay not only a plan for the solution of the public health problems of the city, for which there is immediate and pressing need, but he should outline a program of public health, administrative control, and the cost of such a plan. In this way you will be most likely to discover the man you want for your health officer. Such a man you must have, and such men are today getting the basic foundation of such training in the medical school. It only remains for them to secure such post graduate work, in the laboratories of hygiene and in the schools of social service, as will fit them to learn to practice and to teach the hygiene and sanitation that we desire in present day work.

But the modern health officer, aside from the scientific training in medicine and social service necessary to fit him for the practice of this arduous branch of the new medicine, must be possessed of that executive ability, that enthusiasm and judgment that shall enable him to conduct successfully an office so pregnant with possibilities for the good of his munici-

pality. A man with such training must be willing to serve in an humble capacity for long years, willing to endure, if need be, the clamor of the public; but with all this, he, like the rest of his kind, is human, and you must pay him a living wage and insure him a tenure of office. So far as I am able to discover, you pay him worse than a laborer and treat him like a menial. You unnecessarily interfere with him, and you discharge him with about as much ceremony as you would discharge an ordinary laborer; and yet this is the man to whose care you entrust what you hold dearest on earth—the lives and health of people. This man, on whose skill and judgment you rely for advice and action in times of stress is the man who is usually the poorest paid and the most frequently damned citizen of your city. The worker in other lines has his compensation measured by the results he is able to accomplish, but it is not so with the health officer.

The practice of modern sanitation and hygiene, having for its object the prevention of disease and the prolongation of life, does not lead to increased compensation for the health officer, but, cut off from that increase in private practice which devotion to public duty in America always brings, he lands at the end of his career, out of work, out of money, and out of health. To the city of his service he has usually given the best that is in him, and his labor has been of inestimable value to the life and health of the people of the community; but more than that, if well done, it has been of economic value by lessening the burden which the city has had to bear in caring for the sick, supporting the widowed, the orphaned, and the fatherless, in hospitals and other institutions, through private and public charities. Even more than this, the economic value of his work serves to attract attention to the city as a city of the well; and the advantages of a city where health is high and deaths relatively infrequent will be in the time to come, if not now, more than the advertising advantages of bill boards and newspapers. Our cities are beginning to learn the lesson that our insurance companies are learning, and just as the insurance men have realized that it is better by care to keep their policy holders alive to pay premiums, than it is to let them die and have the companies pay death claims, so our cities are learning that to grow in population and in importance it is not only necessary to attract new citizens, but it is necessary to take care of the health and lives of those they have.

To do all this, and much more, is the work of the new health officer. To do his work well, he will not only have to exercise all the knowledge he has, but he will have constantly to accumulate new knowledge by frequently attending meetings and conventions of sanitary and social workers. He will also have to do a large amount of research work, both directly

and through the labor of those in the laboratory. The equipment of the modern health office, the employment of laboratory workers, and the purchase of apparatus, all cost money, and in the beginning it may be difficult to get all the money necessary to man and equip the various divisions of the department where advanced work should be going on for the solution and interpretation of questions relating to the public health. For the study of cognate subjects, public spirited citizens equip and endow departments in various institutions, and surely no one could place even small sums of money to any better purpose, than for the endowment of special or general work in public health laboratories. Mr. Samuel Hopkins Adams has pointed out that it is the duty of "private philanthropy to point the way to public responsibility"; so I trust, in the future, we may have private help, even for public work, until the time may come when, if cities still pursue their niggardly policy toward the health officer, some private citizen may endow a public health department in the city government, or a chair of public health in the university. Under such conditions, the opportunity to work with a reasonable tenure of office and a fair compensation, the new health officer would become the chief advertiser of your city's health, its wealth, and its progress.

Health Officer, Rochester.

SOME OF THE LARGER ASPECTS OF THE WORK OF THE METROPOLITAN SEWERAGE COMMISSION OF NEW YORK.*

By GEORGE SOPER,
New York City, N. Y.

Two facts must be squarely faced by those whose duty it is to provide for the disposal of municipal waste, whether that waste be solid or liquid:— First, the growth of cities results in the production of constantly increasing quantities of waste; and second, the natural facilities for disposing of this material remain the same, or are actually reduced with the passage of time. The truth of these facts finds abundant illustration in the field of sewage disposal; many rivers and harbors originally able to absorb the sewage which it was convenient to discharge into them, have become offensively polluted and a menace to the public health.

Up to the present time, the cities in the metropolitan district of New York have discharged their sewage, without any restriction, into New York harbor and its immediate tributaries. The result has been that various parts of the harbor, including some of the busiest shipping places, have gradually become foul, and the waters are now black and ill-smelling. The main channels have not yet become excessively polluted, but practically all of the waters of upper New York Bay, and of the East and lower Hudson Rivers, bear unmistakable evidence of sewage

The Metropolitan Sewerage Commission was appointed by the Mayor of New York in accordance with a special act of the New York state legislature. The commission is an engineering board with well-defined powers and duties, created to make a thorough study of the conditions of sewage disposal in the metropolitan district and to formulate a plan for protecting the waters for all time to come.

To persons not familiar with the local conditions, who consider only the great expanse of tidal water available, the need for any other method of sewage disposal than the primitive means which the harbor affords may not be apparent. New York is by no means the first great seaport to feel the need of a system of sanitary conservancy. Boston and the twenty-eight municipilities in its vicinity, have had a metropolitan sewerage commission for years, and have constructed extensive public works for the protection

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

of the tidal waters against pollution by sewage. The City of Providence has long had sewage disposal works. At Baltimore, the question of harbor pollution has passed through the stage of investigation, and the work of constructing a comprehensive sewerage and sewage disposal system is well advanced. In England, a special metropolitan board constructed the large and important system for collecting and purifying the sewage of London. Dublin, Belfast, Glasgow, and Marseilles have constructed engineering works of great magnitude for the protection of their tidal harbors. The number of inland cities situated upon rivers and lakes in various parts of the world which have built, or are considering building, improved sewage disposal works, etc., is large. New York is therefore a follower and not a leader in this matter.

The Metropolitan Sewerage Commission has existed since 1906. In that year, it succeeded the New York Bay Pollution Commission, an honorary body which had been appointed a few years before by the governor of the state to inquire into the sanitary condition of the harbor waters, but found its resources unequal to the undertaking. Two years later, in 1908, the commission was reorganized. It is expected that the commission will go out of existence within three years from the present date. By that time, preliminary plans and estimates will have been made for the public works necessary to divert and purify as much of the sewage as the waters cannot inoffensively and harmlessly absorb. These works will necessarily cost a large sum of money, but it will be the commission's endeavor to keep the cost as low as possible, by utilizing, as far as is consistent with a due regard to public heath and welfare, the absorptive or digestive capacity of the harbor.

The harbor's digestive capacity for sewage is a very interesting question and one which has been made the subject of long, scientific study by the Metropolitan Commission. Aside from this work, the efforts of the commission may be divided into two parts: First, investigations to show the relative condition of the waters in different parts of the harbor with respect to their capacity for sewage, and, second, the formation of a general plan or policy to dispose of the sewage by better means than now exist. In studying the condition of the waters, extensive use has been made of chemical, bacteriological, and microscopical analyses, for which thousands of samples of water have been collected. A steamer was equipped as a floating laboratory so that samples could be examined before their composition could become materially altered. Solid matter from the bottom was collected in all parts of the harbor. Sewage matter was found to exist wherever the currents permitted deposits of any kind to take place.

The commission has found that the movement of tidal water in and out of New York harbor is not an effective means of transporting sewage impurities to sea. In co-operation with the United States Coast and Geodetic Survey, extensive investigations have been made which show that the only movement of water toward the ocean in excess of the movement in the opposite direction consists of the land water which flows down the rivers. At dry seasons this excess is very small. Sea water sometimes flows up the Hudson river for over fifty miles. In consequence of the oscillating movement of the tides, the sewage is carried back and forth indefinitely near the points of discharge. In calm weather solid matter from sewage can be seen floating upon the surface of the water in all parts of New York harbor, and the wind blows the floating refuse to the shores and keeps it there.

In May, 1910, the commission made a full report of its investigations and conclusions. In its report it recommended that an interstate metropolitan sewerage commission be appointed, or, if this was not feasible, that a permanent New York metropolitan sewerage commission be created. It should be the duty of such a commission to exercise supervisory authority over the disposal of sewage in the metropolitan district.

Neither of these recommendations has so far been followed. Instead, the temporary Metropolitan Sewerage Commission of New York has been continued for three years to make plans and estimates for the works which the studies already made show to be necessary. To construct the intercepting sewers and sewage disposal works which doubtless will be required will be a long and costly undertaking.

THE VENTILATION OF EMIGRANT SHIPS.*

By PETER H. BRYCE, M. A., M. D.,
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As the chief officer of a medical inspection service, specifically appointed to examine all the immigrants entering Canada, with the idea of preventing the admission of persons suffering from acute communicable diseases, or from other diseases communicable but less acutely so, such as eye and scalp diseases, and with a view further, to allowing the landing of none not at the moment physically fit to earn a livelihood, my attention was early directed to the conditions existing on shipboard during a voyage, and their relation to outbreaks of disease which from time to time take on the character of an epidemic. During an active experience of over six years, I have naturally formed certain conclusions; one of the most positive of these is that conditions on shipboard in the emigrant quarters of many ships are such as demand radical changes, if very serious injustice to a poor, and, under the circumstances, helpless class of intending citizens of this or other new continents is to be prevented. To illustrate: I recall the S. S. "Montrose," tonnage 4,000, which arrived in Quebec, May 6, 1906, with 1,532 passengers; of these 124 were detained, 64 on account of conjunctivitis and 60 on account of trachoma, or one in every 12 immigrants.

When it is further understood that today at the great British and Continental seaports very complete equipment exists for the housing, inspecting, cleansing, and treating of thousands of emigrants at a time, (5,000 may be housed at Hamburg in suburban premises of many acres in extent, in separate buildings owned and equipped by the Hamburg-American Line) and that for days before arrival at these ports inspection has gone on at the borders and in the interior of Germany, Great Britain, Italy, and other countries, it is apparent that the emigrant going on shipboard at any of these ports today probably represents a higher absolute degree of immunity from disease than would a similar number of persons taken at random in any country in the world. It is evident, therefore, that when such persons have purchased passage on a transatlantic steamship, they have rights which the government of every progressive country should secure to them so far as is consistent with scientific knowledge and the actual practical difficulties of the situation.

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

There has recently been published a very important report on "Steerage Conditions" by the Commission on Immigration appointed under an Act of the United States Congress passed February 20, 1907. The report reads as follows:

"Transatlantic steamers may be classed in three general subdivisions on the basis of their provisions for other than cabin passengers. These are: Vessels having ordinary or old-type steerage, those having the new-type steerage, and those having both. In order to make clear the distinction between these subdivisions, a description of the two, old and new, will be given.

"The old-type steerage is the one whose horrors have been so often described. It is unfortunately still found in *a majority of the vessels* bringing immigrants to the United States. It is still the common steerage in which hundreds of thousands of immigrants form their first conceptions of our country and are prepared to receive their first impressions of it. The universal human needs of space, air, food, sleep, and privacy are recognized to the degree now made compulsory by law. Beyond that the persons carried are looked upon as so much freight, with mere transportation as their only due. The sleeping quarters are large compartments, accommodating as many as 300 or more persons each. . . The berth 6 feet long and 2 feet wide, with 2½ feet of space above it, is all the space in which the steerage passenger can assert a definite right. To this 30 cubic feet of space he must, in a large measure, confine himself. No space is designated for hand baggage. As practically every traveler has some bag or bundle, this must be kept in the berth. . . . At least two large transportation lines furnish the passengers in the steerage eating utensils, and require each one to retain these throughout the voyage. . . . .

"When to this very limited space of much filth and stench is added inadequate means of ventilation, the result is most unendurable. Its harmful effects on health and morals scarcely need be indicated. Two 12-inch ventilator shafts are required for every 50 persons in every room; but the conditions here are abnormal, and these provisions do not suffice. The air was found to be invariably bad, even in the higher enclosed decks where hatchways afford further means of ventilation. . . . . Considering this old-type steerage as a whole, it is a congestion so intense, so injurious to health and morals that there is nothing on land to equal it. That people live in it only temporarily is no justification of its existence. The experience of a single crossing is enough to change bad standards of living to worse. It is abundant opportunity to weaken the body and implant there germs of disease to develop later. . . Legislation, however, may complete what competition began.

"The new-type steerage may again be subdivided into two classes. The best of these follows very closely the plan of the second cabin arrangements; the other in some respects adheres to the old-type steerage. These resemblances are chiefly in the construction of berths and the location and equipment of dining rooms. . . . Staterooms contain from two to eight berths. The floor space between is utilized for hand-baggage. On some steamers special provision is made beyond the end of the berths for baggage. There are hooks for clothes, a seat, a mirror, and sometimes even a stationary washstand and individual towels are furnished. Openings below and above partition walls admit a circulation of air. Lights near the ceiling in the passage-ways give light in the staterooms. In some instances there is an electric bell within easy reach of both upper and lower berths which summons a steward or stewardess in case of need. . . . In spite of the less crowded conditions the air

is still bad. Steamers that were models in other respects were found to have air as foul as the worst. The lower the deck the worse the air. Though bearing no odors of filth, it was heavy and oppressive. It gave the general impression of not being changed nearly often enough."

While it is hardly necessary to say that with the marvellous evolution of naval construction today, whereby a great ocean liner transports its 2,000 or 3,000 human beings 3,000 miles in five or six days, the horrors of ocean voyages are yearly becoming a thing of the past, the quotations already given show how many vessels of the old type still exist with voyages of eight to fourteen days' duration. For instance, during the present year (1910) some 76 vessels have been engaged in bringing immigrants to Canada across the Atlantic, and not more than ten have other than the old-fashioned natural, air-duct ventilation.

In spite of this fact, it is a remarkable commentary on the thoroughness of European inspection that during three months, ending July 31, out of some 80,000 immigrants not more than 400 were detained at Quebec for all diseases not included in the acute contagions. The illustration already given, however, shows what would have happened with perfect certainty, had contagion accidentally been conveyed into the steerage quarters, on any except the largest and best-ventilated ships, if they were crowded as during the spring sailings, or even if they were not crowded. I have learned by personal observation, that when there is not a large number of passengers, two or three compartments only out of eight or nine were used during the voyage for the sake of economy of management.

It is apparent, of course, that no evidence of the serious effects of overcrowding on shipboard during a transatlantic voyage upon the spread of a chronic disease, such as tuberculosis, can be obtained; but we have unfortunately too much evidence of the high mortality from tuberculosis in the navy of different countries to question the extremely serious effects, not only upon the blue jackets, but also upon the 500,000 sailors of different countries who go down to the sea in ships. Thus, in a study of tuberculosis in the U. S. Navy by Surgeon General P. M. Rixey, M. D., in 1908, it is pointed out that for the five years ending in 1906, the German Navy gave a mortality from tuberculosis of 2.4 per 1,000, the British Navy of 3.2 per 1,000, and the U. S. Navy 5.6 per 1,000, or actually 4.9 in the latter during an eleven year period. Dr. Rixey quotes Assistant Surgeon Stitt of the "Wasp," who, after setting forth many of the well-known means by which the dissemination of tuberculosis takes place, goes on to say:

"Anyone who has studied the conditions prevailing on our men-of-war can understand the unfavorable conditions for consumptives when the cubic air space per man frequently falls below 300 cubic feet, and when even if the artificial means of ventilation provides for such deficiency,

proper conditions may not obtain by reason of the tendency to decrease the revolutions of the blower, notably by those in authority, to save coal, etc., but surreptitiously as well, by the men themselves closing valves to mitigate draughts or lessen the noises at night."

In this quotation we have summed up the essential features of the situation, and have fully illustrated its difficulties. That its difficulties have hitherto been and still are great on battleships, has been very admirably set forth in a paper presented at the Army and Navy Section of the meeting of the British Medical Association, held in London last July (1910), by Surgeon L. F. Cope of the Royal Navy, the subject of his paper being "Air and Ventilation in Modern Warships." Surgeon Cope points out that it is none too easy to obtain a constant supply of pure air on a modern warship; that the living space may be taken at about 200 cubic feet per man, that the distribution of air is difficult, and that the blue jacket likes to keep all vents closed. He points out that through a 15½ inch circular port with a hatchway near it, and a difference of 20° F. between the outer and the inner temperature, the air delivery on a calm day gives about 13,000 cubic feet per hour; that is, roughly, enough for four men. He then adds: "It is, however, apparent that when 150 live on a mess deck it is quite impossible to arrange enough ports and hatches to supply them with sufficient air by means of natural ventilation alone."

In modern warships this system has been replaced by fan ventilation. A typical ship of modern type has in all 62 fans ranging in size from 40 in. to 7½ in. in diameter, of which 7 are exhaust and 55 are supply fans. Inlets to the different quarters are provided on the basis of one louvred opening to every 1,000 feet of cubic air space.

Surgeon Cope gives the average of 100 determinations of carbonic acid (CO_2) under various conditions with the same average number of men with the following result:

1. Optimum conditions with all scuttles and hatches open and fans running gave everywhere.................................... 6.6 parts per 1,000 (CO_2)
2. With natural ventilation.............................. 9.0 " " "
3. With artificial ventilation only....................... 8.4 " " "
4. With no attempt at supplying fresh air................13.0 " " "

It was found that all the living spaces where the men and officers live can be supplied by sirrocco fans 12½ in. diameter, with 4,000 cubic feet of air per minute, and that such an area could be properly ventilated where one fan is placed at each portion of the mess deck and supplied with air by a trunk running down from the upper deck. In winter the air was warmed in chambers with steam coils, but became dried to the disagreeable extent of having only 46% of relative humidity. So far no remedy of this condition has been attempted.

I have given briefly the chief facts in these experiments, first, because they are the first I have seen described anywhere relating to the artificial ventilation of a large modern vessel, and second, because they accord so closely with conclusions I have gradually been arriving at with regard to emigrant ships. Recently I went to Europe on a vessel of the most modern construction fitted up with fan ventilation, consisting of 15 inlet fans and 10 outlet fans. There were six decks, and the fan ventilation was supplied to the lower decks, the upper saloon quarters having natural ventilation. At different times I inspected the vessel with the captain and the ship's medical officer, and it was only in the sailors' quarters that the usual stuffiness was noted, and this was owing to the old habit of the sailors in shutting out fresh air. I returned home from the Continent on a twelve day ship, solely for emigrants, on which I was the only saloon passenger. On this voyage I was officially instructed to study the sanitation of the ship. It was a ship of 4,712 gross tons, with accommodation under British Board of Trade laws, adopted in the Canada Immigration Act, for 1,000 passengers, which number was slightly exceeded in the May voyage. On this voyage nine separate compartments contained emigrants, but with the small number on my trip, the largest number was 88 in 2,417 square feet of deck space, in compartment No. 6. With the legal allowance of 2 x 7½ feet, or 15 square feet of floor space with 7 feet height, the cubic air space of this compartment for each emigrant was about 200 cubic feet, which, on a previous voyage with 143 in the compartment, was reduced to about 100. There were the usual inlet and outlet ducts leading from the deck, with cowls set either towards or from the wind. During the whole voyage there were head winds, so that at from 10 to 11 knots an hour a strong wind was always blowing and the conditions were most favorable for ventilation.

The test apartment, compartment No. 6, held only 88 persons (young men), while its legal capacity was 143 or more. This apartment was on the lower deck, and had a floor space of 2,417 square feet. The ventilating duct was 16 feet long, and of 18 inches diameter; the funnel opening on the deck was 30 inches, with a capacity of 254 square inches, or 1.76 square feet.

June 30—Test No. 1, Wind W. W. & S.

Air velocity per anemometer .... 2,519 cu. ft. per 5 min.
Air velocity per anemometer .... 504 per min.
Air supplied per hour .... 55,696 cu. ft.

Test No. 2 (same day).

Air velocity per anemometer .... 2,820 per 5 min.
Air velocity per anemometer .... 564 per min.
Air supplied per hour .... 59,558 cu. ft.

July 4—Test No. 3, 11 P. M.

Air velocity per anemometer	2,015 per 5 min.
Air velocity per anemometer	403 ft. per min.
Air supplied per hour	42,557 cu. ft.
Air for 88 persons	484 per capita
For complement of 143 persons	297 cu. ft.

July 7—Test No. 4, 4 A. M. Compartment No. 6.

Rate of air flow	2,950 per 5 min.
Velocity	590 per min.
Air supplied per hour	64,304 cu. ft.
Air supplied to 88 persons	732 cu. ft. per hour
Air supplied to 143 persons	452 cu. ft. per hour

July 1—Test of air flow Compartment No. 7 (upper deck).

Area 1,391 sq. ft., capacity 82 persons.

Length of duct 8 ft. inlet 16 in. diameter, area 201 sq. in.

Velocity of flow	886 ft. per min.
Air supplied per hour	53,200 cu. ft.

A study of the tables makes it apparent that the average amount of air actually supplied, taking the two extreme tests, was 608 cubic feet per person per hour, with 88 present, or with the legal complement, 374 cubic feet per hour. During the voyage the polymeter readings for moisture remained between 65 and 75 per cent of relative humidity except on one stormy day.

To illustrate the results of the ventilation a number of tests were made on the carbonic acid present in the air, with the results shown in the tabulation given below. It will be noted that the results were obtained during the summer when the outer air was warm and could be introduced unheated without serious inconvenience, and at a time when the ventilation hoods were specially set into the wind to insure the largest amount of air possible. The tests were made in compartment No. 6, whose area has been given.

The amount of carbonic acid in immigrant quarters (Compartment No. 6):

Normal air contains 3 parts carbonic acid (CO_2) in 10,000 parts.

TEST No. 1, 11 P. M.—With apparatus placed between inlet and outlet ventilator. Amount of carbonic acid, 7.5 parts in 10,000 parts.

TEST No. 2, 11:30 P. M.—With apparatus placed at side of compartment. Amount of carbonic acid 10 parts in 10,000 parts.

TEST No. 3, 4 A. M.—With apparatus placed same as in Test No. 2. Amount of carbonic acid, 12 parts in 10,000.

If the estimate be made from these experiments for 143 persons, the number legally admissible to the compartment, the amount of carbonic acid would be proportionately greater per 10,000 parts.

Not only is it made apparent from the table that with the small number, relatively, present and the most favorable weather and wind conditions, the compartment hour by hour became increasingly foul, but a careful estimate made of the accumulating air pollution shows it has also something of a geometrical ratio of progression up to a point where an equilibrium is established between the polluting influence and the fresh air introduced.

But though it is true that the short residence on shipboard in an overcrowded apartment in the stormy weather of the spring, made more foul through seasickness, cannot be productive of the same constitutional evils as continued residence in unventilated quarters, yet the records of immigrant detentions on arrival at our seaports have shown that it is only necessary under such conditions to have a case of infectious disease present in a compartment, such as measles or ophthalmia, in order to have the infection disseminated throughout the whole compartment. Hence it is apparent that in the interests both of the steamship companies and of the emigrants, either one of two methods should be adopted for increasing the amount of fresh air available *per capita* in the sleeping quarters on board ship. These are: Increase of air space per person, or, increase in the amount of fresh air introduced. While the first method may or may not, for financial reasons, always be possible in practice, yet it is certainly possible, by mechanical appliances, to increase very greatly the amount of fresh air driven into a given cubic air space. What is urgently needed is the adoption on the older ships, and indeed even on some of the newer and smaller vessels, of mechanical fan ventilation.

The actual condition of a single ship which arrived in the St. Lawrence this year was as follows:

The ship left Rotterdam on June 13, and arrived at quarantine on the 26th. One case of measles occurring on June 14, was immediately isolated with the members of the family to which it belonged. In the compartment where the case occurred there were 279 individuals, married persons and members of families. The compartment consisted of two decks connected at each end by a small stairway, and these compartments were ventilated by means of these stairways and by a portion of the hatches being left open during fine weather. The beds were set up all around the sides and the eating tables occupied the centre of each deck. On the morning of the 26th (exactly 13 days after exposure on the 13th, when the first rash appeared), several cases of measles were discovered by the ship's surgeon, who continued to find others every hour of the day, until on arrival he reported 21 cases. By 9 P. M. a dozen more were

discovered by the quarantine officer. All the 279 passengers were landed at quarantine. These persons comprised 51 families. Of the number, there were 174 children 18 years and under. The total number of cases was 71. 36 families developed cases; 15 families developed no cases, but the members of these 15 families were all grown up or had had measles recently. It is clear, then, in the condition under which these people were associated in the compartments, that every non-immune person was infected with measles within the short period of 24 hours.

If such is actually the situation, and its truth might be further abundantly illustrated by actual occurrences during the past six years, the fact that the increasing competition between steamship companies may gradually result in adequate remedies being supplied can hardly excuse inaction on the part of those responsible for seeing that what has just been illustrated should no longer be allowed to continue.

As in much of our sanitary progress, if not indeed in all of it, scientific certainty as to our facts is the first essential, so it is especially desirable that the public be informed that progress in this matter will inure to its benefit, and that there will be an elevation of the plane upon which the great commercial and industrial corporations carry on their business.

In the present matter, however, all these several stages have already been reached, both in the United States and in Canada; and from my personal investigations I am convinced that most European countries have likewise realized their duty in relation to the transportation of emigrants. Hence I am convinced that the time and occasion have arrived for making much more scientific and definite the regulations which govern the transportation of emigrants on shipboard, by insisting through boards of trade in the several countries and through immigration authorities that the essential sanitary requirements, which the competition for high class travel has brought about, in the ventilation and other sanitary conveniences of transatlantic vessels, be extended to all ships bringing immigrants to America.

Very stringent regulations are enforced regarding the moral conduct of ship's officers and men in their relation to emigrant passengers; it is surely high time that the sanitation of the vessel in relation to its effect upon their physical well-being be equally cared for.

THE CHEMICAL DISINFECTION OF WATER AND SEWAGE; RECENT DEVELOPMENT AND PRESENT STATUS.

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Recent developments in the use of chemical disinfectants in water and sewage purification have been so rapid and so far-reaching in their consequences that there has resulted a somewhat unusual situation. Processes so novel and of such importance that they have been spoken of as epoch making have been adopted with a rapidity and to an extent that has probably never been equaled in any other single instance; whereas the total amount of available literature and information upon these processes is probably much less than upon any other important process that has ever been developed. This condition is primarily due to the unusual simplicity and cheapness of the processes themselves, and, secondarily, to the fact that they were first called to the attention of those interested at a time when their need was urgently felt. There can be no possible question of their general value and usefulness, and the present indications are that they are rapidly coming into very general use. The possibility of danger in advancing our practice so far ahead of discussion and recorded experience must be obvious. Especially in inexperienced hands may this apparent simplicity of disinfection methods prove to be a delusion; and instances are not wanting, even at the present time, when unforseen and unexpected difficulties have been encountered. Therefore the time seems opportune for a general discussion of the principles underlying the chemical disinfection of both water and sewage, with especial reference to their scope and limitations in the general scheme of purification methods.

We are further advanced to-day in our knowledge of methods of chemical disinfection or sterilization than we are in the knowledge of when these processes may be legitimately used. To this latter aspect of the problem therefore attention is particularly directed at this time.

DISINFECTION OF SEWAGE.

The action of disinfectants upon either water or sewage is primarily a germicidal one; if at the same time slight chemical changes are produced in the other impurities these are incidental and immaterial factors. The disinfection of sewage is therefore called for only under conditions in

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which it is deemed undesirable to allow the discharge of living organisms. Since the pathogenic organisms are the only ones that we may regard as being undesirable, it follows that chemical disinfection of sewage has for its sole purpose the destruction of disease germs. It seems necessary to point out this fact on every possible occasion. The so-called chemical treatment of sewage, or, as it is sometimes described, the chlorine process of sewage purification, seems to have established a name for itself in the lay mind as being a cheap substitute or alternative process for sewage purification of other kinds. It cannot be stated too emphatically that the disinfection of sewage is not a substitute for anything else. None of the other processes of sewage treatment have for their primary object the destruction of germs, unless it be possibly the old slow sand filter. Even if the destruction of germs be the aim in the use of the sand filter that object is rarely attained to any satisfactory degree in practice, No other type of sewage purification can be relied upon to produce bacterial destruction. Effluents from such processes are often no better from a sanitary standpoint, i. e., with reference to the possible presence of disease germs, than the original untreated sewage. It has been the writer's observation that the removal of bacteria observed in various methods of sewage purification is not essentially different from that which is observed in an equal period of time in the stream. Therefore the process of chemical disinfection is unique. It is not a substitute for any other process but a new process with a single and practically unique purpose—the destruction of germs.

Whether or not the destruction of germs is necessary or desirable in any given case is a matter for local consideration. A few of the general principles involved may be laid down without going into any lengthy discussion of the relative merits of sewage purification and water purification in the protection of public water supplies. Surface waters flowing through a populated region require purification to render them safe for domestic purposes, even though they do not receive direct sewage pollution. Furthermore, it is possible to purify badly polluted waters so as to render them fit for domestic use. From these two postulates the position is not infrequently taken, even by some of our eminent state health authorities, that water purification is a sufficient barrier to interpose between the water consumer and a grossly polluted stream, and that efforts toward sewage purification are not only unnecessary but unwise. It would seem, however, that the question might fairly be raised as to how far it is wise to proceed with the unrestricted pollution of streams even though these waters are to be purified before use. It would seem to be almost an axiom of sanitary science that all reasonable precautions against serious

pollution should be taken, and that sources of drinking water supply should be kept as pure as possible, allowing for their reasonable use. Just what constitutes reasonable use of a stream is a matter upon which our courts are still debating. It is of interest at this time to point out that, with progress in sewage disposal methods by which we are able to obtain results of greater and greater excellence at ever-diminishing cost, there will be constantly greater limitations placed upon the reasonable use of a stream. What may be considered an unreasonable demand upon the polluting community today, may, with the improvement in our processes and the decrease in relative costs, be looked upon in the near future as a perfectly reasonable and just requirement. This has been the situation in the sewage disposal problem from the beginning. Only a few years ago, for the authorities to have insisted upon the discharge of disinfected effluents would have been looked upon as an unreasonable and even a ridiculous demand. Today, with the advent of processes of chemical disinfection, such a demand is not only reasonable but is actually being made and enforced in many parts of the country. Thus one role which this process has played in the field of sanitary science has been to make possible through its reasonableness the more perfect purification of polluting waters, thereby diminishing the burden and increasing the margin of safety of water filters and decreasing by just so much the danger of infection.

A second and far-reaching result which has followed the introduction of this process is the protection of the shell-fish industry. Coming, as it did, at a time when this enormously valuable industry was being threatened by the discoveries of bacteriologists and epidemiologists that there was an intimate relation existing between polluted shell-fish and epidemics of typhoid fever, the process of chemical disinfection has been of great value to this industry. The State of New Jersey is today taking active steps toward the full protection of her shell-fish interests by encouraging, as far as practicable, chemical disinfection of all sewage which could by any possibility reach important shell-fish areas. These two applications of chemical disinfection of sewage have been so readily apparent and have had such far-reaching possibilities that the authorities have not been slow in taking them up. Further than this we have not gone at the present time. The danger of pollution along bathing beaches or in waters used for purposes of commerce have heretofore been considered so slight as hardly to justfy any vigorous protest. Here again it may be proper to point out that with increasing knowledge of the methods of transmission of disease and with continued improvements in the process of disinfection, the applications of these processes are becoming more and more

general and their compulsory use more and more reasonable. Looking at the matter from another point of view, chemical disinfection has made possible the discharge of disinfected crude sewage under conditions which would otherwise necessitate efficient filtration. Under suitable conditions of volume of diluting water and strength of current there may be no apparent necessity for the thorough purification of sewage. Such favorable conditions are frequently met with along the ocean front and lakes and upon the great rivers. If, under such conditions, bacterial purification is called for by reason of any of the causes previously enumerated, then disinfection of the crude or partially clarified sewage is suggested, and in many cases such methods have been employed. It provides the one definite remedy for the existing ills and accomplishes the desired results at a minimum of cost. The misuse of this simple remedy, however, will prove a disastrous experiment.

These are the things that the chemical disinfection of sewage have accomplished or may be expected to accomplish. It is readily seen that these are not the things that are accomplished by other methods of treatment. On the other hand, the disinfection of sewage is not intended to accomplish the purpose of sewage purification in general. The latter is undertaken for the protection of streams and other bodies of water against possible nuisances of the grosser sort or against physical nuisances which follow the discharge of untreated sewage into a stream which is too small to give the proper dilution. Where nuisances of these kinds occur the benefits of chemical disinfection applied to relieve putrefactive conditions or for the destruction of germs which are primarily responsible for this condition, are temporary at best, and in the long run futile. Any attempt to oxidize organic matter and in this way rob the sewage of its putrescible characteristics will also at the present time prove futile by reason of the cost involved. There is a possibility that some cheap chemical method of oxidizing organic matter may eventually be discovered. If ozone could be produced today with any approximation to theoretical efficiency it could undoubtedly be employed for that purpose; its vigorous oxidizing action makes it an ideal reagent. But under the present methods of manufacture, giving as they do only five or six per cent. of the theoretical yield, the cost of ozone makes its use in sewage disposal, even as a germicide, prohibitive.

DISINFECTION OF WATER.

In the field of water purification disinfection by chemical means bids fair to revolutionize our practice; but here again, as in the case we have just considered, careful attention must be paid to the limitations of this

process and the field which it is designed to cover; chemical disinfection of water is only incidentally and partially a substitute for other processes. It happens that in water purification the removal of germs is in general the primary object. In addition to this object, however, and sometimes exceeding it in actual importance, is the removal of other impurities of either mineral or organic origin, color, suspended matter such as loam or clay, or, in certain waters, finely divided material discharged from sewers, are typical examples of the kinds of impurity which it may be desirable to remove. In the absence of impurities of these various types, and in cases where minor sources of continuing bacterial pollutions are present, or in the further case of a temporary but more serious bacterial pollution, the application of chemical disinfection is fully justified. Where the character of the untreated waters is such that, regardless of bacteria, its use is repugnant to the physical senses, then more far-reaching purification than that obtained by mere disinfection, is assuredly indicated. As an adjunct in water purification, disinfection has a much more promising field. Particularly in connection with the mechanical filtration of waters will this process be found valuable. Rates of flow upon slow sand filters are determined primarily by the physical character of the water and the effect of the contained impurities upon the expensive process of washing. On the other hand, rates of treatment on mechanical filters are limited largely by the necessity for bacterial efficiency. Therefore, while in the case of certain special types of water the aid of chemical disinfection may make higher rates of treatment upon slow sand filters possible, this supplementary process will undoubtedly find its widest development in the field of mechanical filtration.

Another possible field for chemical disinfection, which has not received the attention which it deserves, is its emergency use in case of some serious mishap by which the water system suddenly becomes contaminated. It should be the duty of every water-works manager to provide, at relatively slight expense, the necessary storage tanks and chemicals which would enable him at a moments' notice to disinfect his entire supply. If it were never used such a plant would represent a very cheap form of insurance against possible accident and loss of life.

Laboratory Section

THE BACTERIOLOGICAL EXAMINATIONS OF SHUCKED AND SHELL OYSTERS.*

By GEORGE W. STILES, M. D., Ph. D.,
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During the last quarter of a century rapid developments have taken place along all lines of sanitary science, and nowhere is this progress more noticeable and striking than in the realm of food bacteriology. Since the passage of the Pure Food and Drugs Act in 1906, the need of bacteriology as applied to sanitation has been amply demonstrated. This is particularly true in connection with the production, care, and handling of all kinds of food material, both in their raw and in their finished state.

The question as to the possibility of oysters and other shell-fish becoming contaminated with sewage-polluted water was one of the first problems to receive consideration after the passage of the Food Law. At the solicitation of a committee representing the North American Oyster Growers and Dealers Association, Dr. H. W. Wiley, Chief of the Bureau of Chemistry, arranged to have the necessary investigation made to study the whole oyster situation. Various phases of the industry were taken up and systematically considered in detail. The writer was instructed to take up the industry from the standpoint of the bacteriologist.†

From the sanitary point of view the ruling of the Food and Drug Inspection Board made it unlawful to ship or sell in interstate commerce oysters or other shell-fish taken from polluted beds. This order also made it unlawful to sell or ship in interstate commerce oysters or other shell-fish which have become polluted because of being packed under insanitary conditions or being placed in unclean receptacles. It was further considered unlawful to ship or sell in interstate commerce shucked oysters to which water has been added, either directly or in the form of melted ice. Food Inspection Decision No. 121, an amendment to F. I. D.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

† The difficulty which in the beginning caused the greatest annoyance to the Oyster Growers' and Dealers' Association was the mooted question as to the best manner of shipping oysters. After the completion of exhaustive experiments carried on under different commercial conditions, and representing various sections of the oyster-producing territory, the conclusions and results of these investigations, together with public hearings with practical oystermen, were condensed and issued October 15, 1909, in the form of F. I. D. No. 110.

110, issued June 4, 1910, concludes by saying, "Oysters found in interstate commerce in a polluted condition because of the character of the water in which they are grown or floated are adulterated under the Food and Drugs Act."

Having finished our shipping experiments, and concluding that shucked oysters should be no longer shipped or sold with ice in contact, our attention was directed to the more serious aspect, viz:, the possibilities of shellfish pollution from sewage polluted water.*

The combined oyster investigations have covered the oyster season of 1908, 1909, and 1910, and the writer has personally gone over the oyster layings, collected samples of water and shell-fish for examination, and at the same time made a careful sanitary inspection of each locality visited. Our investigations have extended from Maine along the Atlantic Coast to the Gulf of Mexico. Approximately one thousand samples of oysters, quahaugs, soft clams, and sea water have been collected and examined bacteriologically during these three years of investigations. These samples represent the product during every step from source of production to consumer.

COLLECTION OF SAMPLES.

SHELL STOCK—Samples of quahaugs (hard clams), soft clams, and oysters in the shell, were fished from the beds by tongs, forks, or dredges, and each sample was properly labeled and shipped to Washington in metal cans generally surrounded by ice, no water coming in direct contact with the samples. During the coldest weather no ice was used for shipping samples.

OPENED STOCK—Shucked oysters and clams were examined, either at the cities in which they were obtained ,or else were shipped, well refrigerated, to the laboratory from short distances,. They were taken from original containers, and placed in sterilized Mason jars. Examinations were begun immediately after their receipt

PREPARATION OF SAMPLES.

SHELLSTOCK—Oyster and clam shells were thoroughly scrubbed in running hydrant water, rinsed in sterile water and the laid between sterile towels to dry. Five medium-sized cleansed oysters were selected, and the lips of each shell were slightly flamed before opening. They were opened with a sterile oyster knife under aseptic conditions. Either the liquor should be drawn off by using sterile pipettes, or the excess of liquor may be decanted into sterilized wide-mouth flasks. We formerly used both the liquor and minced meat of the shellfish for examination, but have

* The writer has now under preparation the report on this phase of the industry, the substance of which has already been presented as a thesis to the George Washington University for the Degree of Ph. D.

now concluded that the liquor represents sufficiently well the whole contents of the shell. The liquor from each oyster for cultural purposes should be placed in separate containers.

OPENED OYSTERS—The liquor from shell stock and that from market shucked oysters is treated in the same manner as any fluid material. In the beginning of our investigations complete samples of five or more shell-fish were treated as one sample. In addition to the use of composite samples we now endeavor to supplement, or rather to precede this method, by inoculating bile or dextrose fermentation tubes with 1 cc., 0.1 cc. and 0.01 cc. of liquor from each oyster and then combining the residue of the five shell-fish to constitute the composite sample. This scheme gives the *B. coli* content for each oyster, as well as the combined lot of five oysters, and enables one to judge more accurately of the character of the material than could be done by a single analysis.

MEDIA EMPLOYED.

PLAIN AGAR AND NUTRIENT BEEF BROTH—This is prepared according to standard methods recommended by the American Public Health Association.

BILE SALT AGAR—Prepared after the formula suggested by MacConkey. Contains 1.5 per cent. powdered agar to the liter of water, 0.5 per cent. sodium taurocholate, 2 per cent. peptone, 1 per cent. lactose, and a sufficient quantity of a 1 per cent. of neutral red to give a light red color to the finished medium. Plates prepared with this medium are incubated 24 to 48 hours, at 37° C. for the isolation of colon-like organisms When present, these organisms appear as smooth, round, raised, entire, glistening, pink colonies. Experience with the use of this media is necessary to enable one to select *B. coli* types from other gas-producing bacteria.

The media used for differential purposes are as follows: (1) Plain agar slants, (2) peptonized beef broth, (3) alkaline litmus milk, (4) potato, (5) Dunham's peptone solution, (6) 2 per cent. dextrose broth, (7) 2 per cent. lactose bouillon, (8) 2 per cent. saccharose bouillon, (9) nitrate-broth, (10) gelatin—all prepared according to standard methods. Cultures are made from well-isolated colonies on bile salt agar and the results noted after inoculation in the above media for a period of not less than two weeks, a longer time should be allowed if practicable.

PLATING SAMPLES.

LIQUOR DIRECT FROM SHELL STOCK—(a) Plate 1 cc., 0.1 cc., 0.01 cc. and 0.001 cc. quantities on plain agar at 20° C. to 25° C. (b) Same quantities plated on plain agar and bile salt agar and incubated at 37° C. Plates incubated from 2 to 4 days according to temperature.

OPENED OYSTERS—Opened market oysters generally require higher dilution than the shell stock, because they usually contain more bacteria. Our experience has shown that dilutions of 0.01 cc., 0.001 cc., 0.0001 cc., 0.00001 cc. or 0.000001 cc. may be necessary, according to age and condition of the oysters, in order to count the colonies. Instead of using only one or two dilutions we employ at least four, attempting to cover the ground above and below the probable bacterial content.

In order to determine the presence of gas-producing organisms and streptococci, we are largely relying upon the use of sterilized ox-bile containing 2 per cent. lactose and 1 per cent. peptone. The bile medium is placed in ordinary test tubes containing small, inverted glass tubes sealed at one end. This form of tube is used in preference to the regular Smith fermentation tubes which are cumbersome, easily broken, and expensive.

STREPTOCOCCI—After about 48 hours' incubation at 37° C., smear preparations are made and stained from the various dilutions of liquid bile cultures. These smears are examined for the presence of streptococci. The diagnosis is made from their morphology alone, no attempt being made regularly to isolate and study them in pure culture. Only cultures showing well-formed chains of organisms are considered positive.

B. coli TYPES—*B. coli* types and allied organisms are isolated in pure culture, either from the initial bile salt agar plates, or, in case of failure from this source, the highest dilution showing the presence of gas-producing organisms is plated on bile salt agar and *B. coli* recovered. Besides observing the staining and morphological characters, all colon-like types of organisms are planted in each of the ten media above described. These cultures are observed from one to three weeks; the gelatin cultures, however, are usually kept for a longer period.

According to our experience, no two strains of colon-like organisms, even from the same source, will give exactly the same biological reactions. Because of this slight variation in some of the lesser details of growth and behavior on culture media, we report all colon organisms as *B. coli-types*, instead of the classical *B. coli communis*.

In my opinion, the presence of *B. coli* in appreciable numbers in any food material, is positive evidence of fecal contamination and sufficient to condemn the product for human consumption.

The appended tables illustrate the relative bacterial content of oyster and clam liquor, taken directly from the shells under aseptic conditions, when compared with the liquor of opened market oysters shucked under ordinary circumstances.

TABLE No. 1.

Results of the Bacteriological Examination of Oyster Liquor in the Shell, Collected from Miscellaneous Sources. Opened under Aseptic Conditions. Season of 1909 and 1910.

No.	Organisms per cc. after 3 days' incubation			*B. coli* type. 2% Dextrose fermentation tubes	Number of individual oysters showing presumptive *B. coli* in 1 cc., 0.1 cc. and 0.01 cc., quantities of liquor.
	Plain Agar 25° C.	Plain Agar 37° C.	Bile Salt Agar 37° C.		
1	500	50	0	1	2 out of 5 in 1 cc.
2	9,900	240	260	1	1 out of 5 in 1 cc.
3	600	230	110	1	1 out of 5 in 1 cc.
4	3,000	1,000	400	0	0 out of 5 in 1 cc.
5	10,000	1,900	440	10	1 out of 5 in 1 cc., 1 in .01 cc.
6	5,100	700	1,100	10	2 out of 5 in 1 cc., 2 in 0.1 cc.
7	3,800	410	30	1	1 out of 5 in 1 cc.
8	10,500	4,400	500	1	2 out of 5 in 1 cc.
9	4,000	2,700	1,200	10	3 out of 5 in 1 cc., 1 in 0.1 cc.
10	3,800	1,800	60	10	2 out of 5 in 1 cc., 1 in 0.1 cc.
11	23,000	1,000	400	100	4 out of 5 in 0.01 cc.
12	1,900	50	0	0	
13	1,100	230	20	0	
14	8,400	320	0	0	
15	8,000	700	0	0	
16	2,400	600	100	0	
17	5,000	400	100	0	
18	4,000	400	0	0	
19	1,000	80	0	0	
20	20,000	1,000	200	0	
21	600	400	0	0	
22	3,200	900	100	0	
23	26,000	2,000	1,200	10	
24	16,000	2,100	70	10	
25	9,000	2,000	40	1	
26	210	60	0	0	
27	4,000	2,000	100	0	
28	500	100	30	0	
29	7,000	600	40	10	
30	1,400	500	300	100	
31	6,000	3,000	100	0	
32	150	20	0	0	
33	8,000	900	100	0	
34	700	100	10	0	
35	2,000	1,100	100	0	
36	11,000	1,200	50	0	
	6,000	1,000	200	7+	

Maximum count 26,000, minimum 150 organisms per cc. of liquor.

Maximum *B. coli*-type 100, minimum 0. per cc.

Results show that 21 of the 36 samples contained no *B. coli* in 1 cc. quantities, while only 9 of the remaining 15 samples showed more than one *B. coli* per cc. of the liquor.

TABLE No. 2.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF QUAHAUGS (HARD CLAMS), COLLECTED FROM MISCELLANEOUS SOURCES, OPENED UNDER ASEPTIC CONDITIONS SEASON OF 1909 AND 1910.

No.	Organisms per cc. after 3 days' incubation			*B. coli* type. 2% Dextros e fermen- tation tubes 37° C.	Number of individual clams showing presumptive *B. coli* in 1 cc. and 0.1 cc. quantities of liquor.
	Plain Agar 25° C.	Plain Agar 37° C.	Bile Salt Agar 37° C.		
1	70,000	40,000	8,000	10	5 out of 5 in 1 cc., 1 in 0.1 cc.
2	12,000	10,000	700	10	2 out of 5 in 1 cc., 1 in 0.1 cc.
3	15,000	5,000	1,200	1	5 out of 5 in 1 cc., 0 in 0.1 cc.
4	16,000	10,000	800	1	2 out of 5 in 1 cc., 0 in 0.1 cc.
5	30,000	19,000	8,000	10	5 out of 5 in 1 cc., 4 in 0.1 cc.
6	10,000	1,000	900	0	
7	90,000	11,000		1,000	
8	90,000	11,000		100	
9	263,000	43,000		100	
10	4,300,000	50,000		10	
11	16,800	12,800		100	
12	105,000	51,000		100	
13	97,000	45,000		100	
14	2,000	500		10	
15	23,500	8,000		100	
16	91,000	47,000		100	
17	31,000	13,000		1,000	
18	8,600	5,000		0	
19	6,800	3,500		0	
20	198,000	19,000		1,000	
	275,000	18,000	3,000	180	

NOTE—Maximum count at 25° C. 4,300,000, minimum 2,000 organisms per cc.

Maximum *B. coli*-type 1,000, minimum 0. per cc. liquor.

Results show that these clams contained more bacteria than did the shell oysters. This may be partly explained by the fact that many of the samples were collected from highly polluted water.

Sample No. 10 also raises the average higher than would be the case under ordinary conditions.

TABLE No. 3.

RESULTS OF THE BACTERIOLOGICAL EXAMINATIONS OF 33 SAMPLES OF SHUCKED MARKET OYSTERS COLLECTED JANUARY, 1910.

No.	Organisms developing after 3 days			2% Dextrose Fermentation tubes	
	Plain Agar		Bile Salt Agar	*B. coli* per cc.	Streptococci per cc.
	25° C.	37° C.	37° C.		
1	425,000	40,000	7,000	10,000	100
2	245,000	33,000	1,500	1,000	1,000
3	2,350,000	1,550,000	185,000	100,000	10,000
4	575,000	95,000	6,500	100,000	0
5	285,000	8,000	8,000	10,000	0
6	4,750,000	200,000	4,000	100,000	0
7	137,000	23,000	4,000	10,000	0
8	450,000	110,000	7,000	10,000	100
9	750,000	450,000	450,000	100,000	1,000
10	135,000	40,000	23,000	10,000	1,000
11	245,000	70,000	9,000	10,000	10,000
12	1,050,000	500,000	75,000	100,000	1,000
13	260,000	150,000	85,000	100,000	10
14	2,250,000	225,000	32,000	100,000	10
15	175,000	31,000	7,000	1,000	10,000
16	2,300,000	1,500,000	250,000	1,000,000	100,000
17	430,000	45,000	5,000	10,000	1,000
18	1,450,000	350,000	65,000	100,000	1,000
19	700,000	250,000	80,000	100,000	10
20	250,000	215,000	20,000	10,000	1,000
21	105,000	45,000	300	100	10
22	3,200,000	1,750,000	30,000	100,000	1,000
23	550,000	155,000	21,000	10,000	10
24	900,000	195,000	12,000	10,000	1,000
25	1,450,000	125,000	2,500	100,000	1,000
26	750,000	55,000	4,000	10,000	10,000
27	400,000	11,000	1,500	1,000	1,000
28	365,000	18,000	2,500	10,000	10
29	290,000	112,000	25,000	100,000	1,000
30	15,500	2,200	Below 100	0	1,000
31	280,000	140,000	50,000	100,000	100,000
32	550,000	17,000	1,000	10,000	10
33	550,000	11,000	1,000	1,000	0
	867,000	268,000	45,000	74,000	8,000

NOTE—Maximum count at 25° C. 4,750,000, minumim 15,500 organisms per cc.
Maximum number *B. coli*-type 1,000,000, minimum 0, per cc. liquor.

Results obtained from plating duplicate samples. Shell stock opened under ordinary commercial conditions usually kept with ice in contact in uncovered containers.

Sample represents both freshly opened oysters and those of a variable length of time out of the shell.

The contamination of oysters may occur from any one or more of the following sources:

(a) Contaminated grounds.

(b) Polluted water in which they are floated.

(c) Insanitary shucking houses.

(d) Washing with impure water and contaminated ice.

(e) Unclean methods of handling, packing, and shipping.

(a) Vast areas of valuable oyster grounds are admirably located for oyster culture all along the Atlantic Coast. Years ago no difficulty was experienced from pollution by sewage, but the conditions have now changed. Many localities where oysters grow are dangerously polluted, and the extent and seriousness of this pollution will continue to increase so long as man is content to discharge his waste promiscuously into our natural bodies of water. Sewage is the greatest enemy to the progress of the oyster industry. The practical solution of this problem resolves itself into one of two things, either the shell-fish must be removed from the polluted water, or else the untreated sewage must not be allowed to flow into the water over shell-fish layings.

(b) Oysters grown on grounds free from contamination will become infected if floated in sewage-polluted water. Many of the recorded epidemics of disease resulting from eating contaminated oysters were those which the oyster had been previously floated in sewage-polluted water. As ordinarily practiced, the process of floating oysters in water of a questionable purity should be prohibited.

(c) The ordinary oyster-shucking establishment is an extremely insanitary place. There are, however, a few modernly constructed buildings, fully equipped with sterilizing facilities and proper methods for carrying on such business where sanitary measures are enforced. Oyster houses should be built and so arranged as to be kept free from cobwebs, dust, filth, and the undesirable elements.

(d) Shucked oysters should be washed with pure water and ice. Contamination may result from this source alone. Natural ice froxen from polluted water will contaminate oysters if it is placed in the water for washing purposes.

(e) Unclean methods of handling, packing, and shipping oysters may result in contamination of the product, even though it is free from pollution at the beds. All utensils, tubs and containers used by oystermen should be efficiently cleaned and sterilized by the use of live steam or BOILING water. Oysters produced and handled under clean conditions, and properly refrigerated, will remain in good condition for several days.

CONCLUSIONS.

Shucked oysters, as ordinarily found on the market, contain more bacteria per given volume of liquor than oysters opened directly from the shell under clean conditions.

The bacterial content of opened market oysters may include numerous colon bacilli and streptococci. Each of these organisms is not only evidence of fecal contamination, but to my mind, when present in such large numbers as indicated in table No. 3, their toxins may cause gastro-intestinal derangements of a serious nature, if consumed raw by susceptible individuals.

Oysters may be grown on pure grounds and remain in good condition while in the shell, but, because of unclean methods of shucking and handling they may be subsequently contaminated and rendered unfit for food.

There is no assurance that shucked market oysters are always cooked before consumption. They may be served raw on old shells, in the form of cocktails, on plates, or in some other manner.

Oysters intended for human consumption should be grown in water free from pollution, and the greatest care should be exercised to keep such a product in a clean and wholesome condition until consumed.

THE SOURCE, MANUFACTURE AND COMPOSITION OF COMMERCIAL AGAR AGAR.*

By H. A. WHITTAKER, B. A.,
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Agar agar or Japanese isinglass, the seaweed well known in commerce, is derived from several species of aquatic plants. It is made principally from algae of the genus *Gelidium* (a). The species (b) most commonly in use are *Gelidium Amansii, Lam., G. elegans, Kutz., G. polycladum, Kutz.,* and more sparingly, *G. Japonicum, Okam., G. Subcostatum, Schmitz,and Acanthopeltis Japonica, Okam.* The species (b) which are added to the inferior qualities of the article are probably *Camphylaephora hypneoides, Ceramium rubrum, Gracilaria confervoides and G. lichenoides.*

A large proportion of the world's output of this product is collected and manufactured in Japan. The term "*kanten*" is applied by the Japanese to the product comparable with agar. The algae grow on rocks along the coast and are collected by divers during the period between May and October, the best months being July and August. The weed is dried on the shore during which process it is partially bleached and is then ready to be manufactured into the commercial product.

A brief account of the method of manufacture as described† in the Bulletin of the Bureau of Fisheries, will be of interest here.

"The process of making *kanten* is quite elaborate, although the appliances required are simple and inexpensive.

(1) The first step is the removal of all foreign matter from the masses of dried algae. Calcareous and other hard particles are dislodged by beating and pounding, and other substances are picked out by hand. Further cleaning is effected by washing in running fresh water.

"(2) The wet algae are then spread in thin layers on flakes with bamboo or reed tops, through which the water drains. The principal object in thus spreading the algae is to bleach them; this is done in warm weather, beginning in August, and is facilitated by dew. Under favorable conditions, twenty-four hours may be sufficient, but usually several days are required.

"(3) As the drying goes on, the algae become agglutinated and more or less fused, forming loose-meshed sheets. These sheets are loosely rolled, and, as required, are boiled in fresh water in a large iron kettle or a wooden tub placed over a specially constructed oven or furnace. The boiling extracts the gelatin, and a thick, pulpy mass results. From the boiling kettle the jelly is strained or filtered

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

† Vol. XXIV, 1904, pages 137–141.

through coarse cloths into a vat or tank, this preliminary straining being followed by a more thorough straining through linen bags of coarse mesh which are placed in a crib and squeezed by means of a lever, the jelly falling into a large vat under the press.

"(4) From the vat the jelly is dipped with a peculiar rectangular wooden vessel and poured into wooden trays to cool. These trays are about 2 feet long, 1 foot wide, and 3 inches deep, and are arranged in rows in the open air, resting on parallel poles so as to be clear of the ground.

"(5) At a certain stage of the cooling and hardening process, the contents of the trays are cut into pieces of uniform size, in order to facilitate handling. The cutting is done by means of oblong iron frames, adapted to the shape of the trays, divided into squares of various sizes. One face of the frame has sharpened edges, and the cutting is done by inserting the frame along one side of the tray and drawing it horizontally through the jelly.

"(6) The bars are then put one by one in a wooden box slightly larger than themselves and with a coarse wire grating over the lower end. A wooden piston with a broad end fits into this box, and is pushed against the bar of jelly, forcing it through the grating in the form of slender sticks. Another way in which *kanten* is prepared is in the form of blocks, 1¼ to 1½ inches square and 10 to 12 inches long, which are made with a cutting frame such as has been referred to. There is a shrinkage of one-third in bulk in the course of solidifying.

"(7) The sticks and bars of hardening jelly are arranged in regular rows on flakes occupying an exposed position on a mountain or hillside. The congealing requires one to three days, according to wind and temperature, and a further drying of three or four days is usually allowed. A northwest wind is considered as giving the best results.

"(8) The thoroughly dried pieces are trimmed to uniform lengths and baled for shipment. The thin sticks, known as *huoso-kanten* (slender *kanten*), are 10 to 14 inches long and about one-eighth of an inch thick, and are tied into bundles weighing about 6 to 10 ounces; the bundles are packed in bales holding 100 kin (33 pounds), incased in several layers of matting. The blocks, which are called *kaku-kanten* (square *kanten*), are not adapted for close packing, and make a very bulky bale; about 50 blocks weigh 1 pound."

THE CHEMICAL COMPOSITION OF AGAR AGAR.

Since agar was first applied by Hesse in the preparation of culture media its use has become more extensive each year in bacteriological work. Investigations on the composition of this material have appeared from time to time in chemical literature. Reichardt (e) was probably the first to study agar as a carbohydrate. Bauer (d) later hydrolized agar with dilute sulphuric acid and isolated a sugar corresponding to lactose. By lactose Bauer understood the sugar which is today called galactose.

Payne (e) found in agar a carbohydrate and named it gelose. To this he ascribes the gelatinizing power of this substance in aqueous solution. Gelose (f) is said to contain C 42.77; H 5.77; O 51.45 percent. This

composition corresponds to the formula $C_{11} H_{16} O_{10}$ but the formula $C_6 H_{10} O_5$ is sometimes used. According to Bauer (g) and Porumbaru (h) gelose has the same elementary formula as gelactan.

In the more recent investigation of Konig and Bettels (i) the products of agar have been carefully studied. Their work includes a resumé of previous investigations and contributes much valuable material on the products resulting from the hydrolysis. They have separated from the liquid resulting from hydrolysis with acid, compounds comparable with laevulinic acid and galactose. The discovery of galactose corroborates the results of Bauer before mentioned. They further examined the flocculent precipitate formed on hydrolysis with acid and found it to consist of cellulose.

This laboratory has found it impossible to secure a consistent product from different shipments of agar even when the same form and quality was specified. It was further noted that this variation materially affected the appearance of the media in which it was used.

TABLE I. The Chemical Composition of Commercial Agar Agar.

No.	Form	Quality	Price per Lb.	Moisture	Crude Fiber	Crude Protein (Nx6.25)	Carbohydrate	Ash
1	Slender	No. 1	$1.60	13.10	0.47	2.21	80.34	3.88
2	"	No. 2	1.00	13.37	4.27	2.06	76.27	4.03
3	"	No. 3	.80	13.79	1.12	2.41	79.26	3.42
4	"	Best	.75	14.39	0.35	1.49	80.17	3.60
5	"	"	.65	15.20	0.41	2.02	78.52	3.85
6	"	"	1.00	16.39	0.77	1.71	77.62	3.51
7	"	"	1.14	15.64	0.40	3.25	77.47	3.23
8	"	"	.90	15.46	0.39	1.77	78.89	3.49
9	Powdered	"	1.60	11.39	2.62	3.58	74.91	7.50
10	"	"	1.30	13.92	0.42	2.46	79.65	3.55
11	"	"	1.60	13.71	0.16	2.18	80.06	3.89
12	"	"	1.48	13.48	0.23	1.85	80.53	3.91
13	"	"	1.40	14.54	0.36	3.11	78.30	3.69
14	"	"	1.50	14.86	0.27	1.85	79.46	3.56
15	Bar	"	.80	15.13	0.72	3.16	77.11	3.88
16	"	"	1.32	16.03	0.37	1.16	78.75	3.69
17	"	"	.85	16.50	0.30	1.17	78.49	3.54
Minimum			.65	11.39	0.16	1.16	77.11	3.23
Maximum			1.60	16.50	4.27	3.58	80.53	7.50
Average			1.16	14.52	0.80	2.20	78.57	3.89

Determinations of moisture and Ash by B. M. Mohler.

The analyses recorded in Table I were made for the purpose of determining what variations existed in the different forms and qualities of agar now sold to laboratories for the manufacture of culture media. These samples were purchased from the following distributors in this country: E. Leitz & Co., Eimer & Amend, New York; A. H. Thomas, Philadelphia; Bausch & Lomb, Rochester; Henry Heil & Co., St. Louis; E. H. Sargent & Co., Chicago; Noyes Bros. & Cutler, St. Paul and O. Kai & Co., San Francisco. The three forms common to the trade were secured, namely, slender, bar, and powdered. The two forms most easily secured are slender and powdered. The bar form appears not to be so well known to the dealers. Several of the large distributors claim to purchase their supply from importers who secure their material directly from the Japanese maunfacturers. It was found possible to purchase from certain dealers three qualities of the product, Nos. 1, 2 and 3.

The analytical methods used in the determinations made in Table I are those recommended by the U. S. Department of Agriculture.* The carbohydrate in all cases was determined by difference.

Table I includes data and analyses on seventeen samples of material collected. This includes eight samples of the slender, six of the powdered, and three of the bar form. The price paid for the same quality and form ordered varied from $0.65 to $1.60 per pound. The analytical results show appreciable variations in the composition of the samples exmained. These differences are probably due to the species of algae used and the care taken in the collection and preparation of the material for market.

The portion of agar essential in the preparation of culture media as it is commonly used is the carbohydrate content furnishing the gelatinizing power; hence the exclusion of other material may be assumed to add to the purity of this product for this specific purpose. Therefore the gross standard of purity used in the discussion of these results is based upon the above assumption.

The moisture content of agar, as in other materials possessing absorptive powers, fluctuates with the atmospheric conditions under which it is kept. The differences noted in the results may be due either to the absorptive power of the different samples or the varying atmospheric conditions to which they were subjected.

The crude fiber includes principally the coarse cellulose content not separated from the other material in manufacture. The differences in the results are due to the imperfect filtration or straining of the liquid agar

*Bulletin 107, U. S. Dept. Agric., Bu. of Chem., General Methods for the Analysis of Foods and Feeding Stuffs.

before drying for market. The high results indicate careless preparation of the product.

The crude protein as designated in the table is the product of the total nitrogen and the empirical factor 6.25. The variation in results is probably due to the different species of algae used, the amount of nitrogen available for different plants of the same species, and the amount of soluble nitrogen extracted in preparation.

The carbohydrate content was determined by difference and is intended to include the gelatinizing principal of the material. This result naturally fluctuates with the total percentage of the other determinations. The exclusion of other materials brings up the carbohydrate content.

The ash includes the mineral matter. The differences noted in analytical results are due to the normal inorganic constituents of the algae, the diatomaceous substances found with the plant in sea water, and the character of the water used in the process of manufacture. The water soluble portion of this content should be entirely removed.

Attention is called to analyses Nos. 1, 2 and 3. It appears that the quality branded by the distributor bears no relation to the chemical composition. Sample No. 2 of second quality is analytically inferior to No. 3 of third quality. The form appears to be no index to purity as quite comparable analyses are found in all forms. The unusually high ash content in sample No. 9 was found to be largely silicon dioxide and may have been added as an adulterant.

THE INORGANIC COMPOSITION OF THE ASH.

It is important in some lines of bacteriological work to know the inorganic constituents of agar, for instance, in the preparation of synthetic media. Inorganic salts are generally known to affect the activity of certain organisms in specific media; it is therefore necessary in cases where agar is used to have a knowledge of the composition of the ash representing the inorganic content.

The results given below in Table II were made on the ash as determined in Table I on samples Nos. 2, 4, 5 and 17. The results are expressed in grams per 100 grams of agar.

TABLE II. The Inorganic Composition of the Ash of Agar.

Sample No.	No. 5	No. 2	No. 17	No. 4
Silicon dioxide, SiO_2	0.24	0.62	0.34	0.39
Iron and Aluminum, Fe and Al	.17	.16	.15	.16
Calcium, Ca	.57	.88	.35	.66
Magnesium, Mg	.44	.10	.41	.26
Sodium and Potassium, Na and K	.29	.12	.16	.11
Sulphate, SO_4	1.76	1.49	1.94	1.56
Chlorine, Cl	.30	tr	.20	tr
Bromine, Br	0.	0.	0.	0.
Iodine, I	0.	0.	0.	0.
Phosphate, PO_4	0.	0.	0.	0.
Carbonate, CO_3	0.	0.	0.	0.
Total Ash	3.85	4.03	3.54	3.60

Attention should be called to the fact that prolonged heating was required to completely convert the organic material in these samples to ash, and this may have affected certain of the results, such as the bromine, iodine and carbonate.

THE ABSORPTION OF MOISTURE.

Agar like many other organic substances readily takes up moisture when exposed to a moist atmosphere. The analytical results (Table I) show a minimum absorption of 11.39 and a maximum of 16.50 per cent. under ordinary conditions. Several samples of agar were dried to constant weight and placed in an atmosphere practically saturated with water at a temperature of 28° C. Table III shows the percentage of moisture normally present and the total percentage absorbed after exposure to a saturated atmosphere at 28° C.

TABLE III. Moisture Absorption of Agar.

Sample No.	% Moisture Under Normal Conditions	% Moisture In Saturated Atmosphere 28° C.
1	13.10	28.10
2	13.37	27.60
3	13.79	27.70
6	15.20	28.70
17	16.50	28.20

These results show that under conditions not unreasonable to expect in certain sections of the laboratory, agar will absorb a large amount of moisture. In this way large errors may be made in the preparation of

agar solutions of definite strength unless the material is dried to constant weight before use. For example, a sample containing 15% moisture if used to prepare a 1.5% agar solution would result in a solution containing only 1.28% agar, while a sample containing 28% moisture would result in a 1.08% solution. It should be required in the preparation of culture media that agar be dried to constant weight at 100° C. before use.

PURIFICATION OF AGAR BY AQUEOUS EXTRACTION.

In order to determine the amount of material removed from agar by aqueous extraction, 10 grams of commercial agar (sample No. 2) was placed in 1000 cc. of distilled water and allowed to stand for 18 hours, the extract was then filtered, replaced by a second 1000 cc. of distilled water, and again extracted for 24 hours as before at room temperature. The agar was then dissolved in 1000 cc. of distilled water and filtered through fine cotton gauze. The resulting liquid was evaporated to dryness on the water bath, allowed to stand exposed in the laboratory for three days to absorb normal amount of moisture and analyzed. The following are analyses of sample No. 2 before and after purifying.

	Moisture	Crude Fiber	Crude Protein	Carbohydrate	Ash
Before	13.37	4.27	2.06	76.27	4.03
After	12.25	0.	1.67	83.72	1.67

The aqueous extract evaporated to dryness and heated to constant weight at 100° C., showed a total removal of 20.3% of material of which 2.36% was ash. The treatment of sample No. 5 in a similar manner removed 18.03% of soluble material.

These results indicate that by simple aqueous extraction and filtration a large amount of objectionable material can be removed.

SUMMARY AND CONCLUSIONS.

1. Commercial agar agar as found upon the American market is a variable product which can be much improved by careful selection and preparation of the material by the manufacturers.

2. It is suggested that a standard of quality be specified in the purchase of material used for bacteriological purposes requiring less than 15% moisture, 0.5% crude fiber and 2.5% ash.

The analysis of the ash shows the presence of inorganic constituents common to plant life from such a source, and this knowledge may be important in the preparation of certain culture media.

4. The results show the amount of moisture absorbed by agar to vary approximately from 13% to 28%, and it is suggested that all agar used in preparing media of definite percentage strengths be dried to constant weight at 100° C. before use.

5. The aqueous extraction and filtration of agar, as described, removes a large percentage of objectionable material for bacteriological purposes.

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Ztschi. Untersuch. Nahr. is. Genussmtl. Vol. 10, No. 8, 1905, P. 457-473. Abs. in Expr. Sta. Rec. Vol. XVII. P. 889.

The writer wishes to acknowledge the valuable suggestions and criticisms made by Dr. H. W. Hill and Dr. F. F. Wesbrook, of the Minn. State Board of Health Laboratory.

SOME RESULTS OBTAINED FROM THE DIGESTION OF SUSPECTED TUBERCULAR SPUTUM.*

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In 1906 one of the writers (B. R. R.) read a paper§ before the Laboratory Section of the American Public Health Association, describing a shaking machine devised for the purpose of thoroughly agitating sputum specimens, thus breaking up all caseous particles and coagulated masses, and rendering the material to be examined entirely homogeneous. Comparative results on 1000 specimens showed that not only was the chance of finding tubercle bacilli increased when they were very few in number, but the increased ease of manipulation rendered the use of the machine of value in any event. Experiments on the digestion of sputum with caustic alkali were at that time under way and were quoted in the paper mentioned, but subsequent experiments showed that the use of this and certain other digestants were attended with some uncertainty, as there appeared to be some tendency to dissolve the tubercle.

Numerous articles have appeared in medical papers advocating the use of an alkaline solution sold under the trade name of antiformin as a digestant for sputum. The authors therefore decided to compare the results obtained with undigested shaken specimens of sputum with the results obtained on the same specimens after digestion. As the work progressed several methods of applying the digestant were tried. As there was some delay in obtaining the necessary apparatus the number of tests made were consequently limited to the number of specimens of sputum submitted between April 1, 1910 and August 15, 1910.

The new model shaking machine used gives the specimens a slight sideways as well as an up and down motion, and results in a much more thorough agitation in a shorter space of time than could be possible with the simple to and fro motion of the old model.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.
† Formerly Chief of Laboratories, Ohio State Board of Health.
‡ Formerly Bacteriologist, Ohio State Board of Health.
§ Vol. XXXII, Pt. 2, page 119.

Three lines of procedure were followed:

PROCEDURE 1. At first the sputum was shaken for seven minutes, and a portion smeared, stained, and examined, the remaining portion being afterwards treated with antiformin (2 to 3 cc), shaken for five minutes, treated with ligroin, shaken three minutes, and centrifugalized*. The film obtained was then smeared, stained, examined, and compared with the undigested smear. The total time of digestion was not over ten minutes in any case, including the time the specimen was in the shaker. The total number of examinations made according to the above described procedure was 327, from which 111 positive results (34%) were obtained altogether. By the direct method a total of 107 were found positive, while the digestion method gave a total of 105 positives only; but 4 positives by the digestion method had been previously negative by the direct method, while 6 positives by the direct method were negative by the digestion method.

When digested for a short period only, as outlined above, the appearance of the specimen after smearing and staining did not differ greatly from the same specimens smeared directly after shaking and without digestion. Some debris was of course eliminated, but sufficient was left to make certain that the digestion was not complete. For this reason it was decided to try a longer period of digestion, and the following procedure was carried out:

PROCEDURE 2. After shaking and examining the specimen, it was then treated with antiformin (2 to 3 cc) and allowed to stand over night, usually about 20 hours, without shaking. The ligroin was then added, a three minute shaking given, after which the specimen was transferred to the centrifuge, whirled, and the film smeared and examined. This procedure was carried out with 44 specimens, of which a total of 20 (45%) were finally proved to be positive (16 being positive by the direct method and 20 by the digestion method). This long period of digestion gave very beautiful results, the field being almost wholly free from debris, and the tubercle bacilli staining rapidly and well. When the digestion is carried as far as possible with subsequent centrifugalization, any undigested tubercle organisms present are concentrated in such a small area that they must surely be discovered. Until one is accustomed to the method some delay in focusing occurs, owing to the fact that digestion is so complete that but little is left upon which to focus.

The greatest drawback to the foregoing procedure is the length of time necessary for complete digestion, which necessarily delays the report. The attempt, therefore, was made to shorten the digestion period.

* Any undigested material collects in a thin film between the ligroin and the digested sputum.

Procedure 3. To this end it was determined to try the effect of shaking the specimen with antiformin for a 15 minute period, and then allowing the specimen to stand for one hour before adding the ligroin and centrifugalizing. Fifty specimens were treated in this manner. Of these 50, a total of 26 specimens (52%) were positive, 21 by the direct method and 26 by the digestion method. One specimen not included in the above-mentioned figures showed no bacilli on the direct method, and but two acid-fast organisms after digestion. This specimen was reported as suspicious, and another specimen requested.

While the smears obtained by the third method show that digestion is not as complete as by the over-night method, in no case was there sufficient debris to cause trouble, while the results obtained were fully as good.

Unfortunately, owing to a limited laboratory force, it was impossible to have the direct smears checked by a second diagnostician. The objection may be raised that further searching of the direct smears might have resulted in a few organisms being found. This is of course possible; a period of about ten minutes, however, was given to each smear before calling it negative, and it is probably true that this is the average time devoted to one smear in the majority of laboratories, since in many laboratories but one man is available for sputum work.

From the results of our experiments we believe that quick digestion by means of the shaking machine (procedure 3) gives as good results as over-night digestion, While the total number of specimens examined by third method were hardly sufficient to base a definite opinion on it is our believe that the method possesses advantages and gives promise of greater accuracy than can be obtained from undigested specimens.

Section of Municipal Health Officers

SOME PRELIMINARY NOTES ON THE USE OF STREPTOCOCCUS VACCINE AS A MEANS OF PROPHYLAXIS AGAINST SCARLET FEVER.*

By EDWARD T. BIWER,
Superintendent Contagious Disease Hospital, Chicago, Illinois.

In dealing with the contagious disease situation in the city of Chicago, the Health Department strongly urges the hospitalization of all cases of scarlet fever and diphtheria; to that end the city maintains a contagious disease hospital in which are treated all cases of diphtheria seeking hospital treatment, while the scarlet fever cases are taken care of in the Cook County Hospital.

In the city contagious disease hospital, we have been constantly face to face with the problem of scarlet fever developing among our diphtheria patients through the admission of cases of scarlet fever in the incubation stage which have been diagnosed as diphtheria outside, and through the admission of unrecognized mixed cases.

At a meeting of the department of health early in March of the current year, prophylaxis against scarlet fever by means of the injection of killed cultures of streptococcus, isolated from the throats of persons sick with scarlet fever, was suggested by Dr. Hektoen of the Memorial Institute for Infectious Diseases, who told of the work being done in Russia along these lines. As a result of Dr. Hektoen's statements it was decided to try this method at the city hospital.

The streptococcus vaccine used by us is prepared by Dr. Weaver of the Memorial Institute and differs from that in use in Russia only in the method of preparation. In Russia the vaccine is prepared according to the method of Gabritchewsky, who used a concentrated bouillon culture of the streptococcus isolated from persons ill with scarlet fever, and killed by heating to 60° C. Weaver and Tunnicliff have found† that the injection of streptococci killed by heat is without satisfactory result in the treatment of streptococcus infections, and decided to test the efficacy of

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

† Journal of Infectious Diseases, Vol. V, No. 5, page 589.

streptococci killed by suspension in chemically indifferent agents. They accordingly proceeded as follows: The streptococci were grown on blood-agar slants in ordinary test tubes; after 24 hours at 35° C. the water of condensation was removed and the bacteria on the surface suspended in a sterile 25% solution of galactose. The suspension was kept in the incubator at 37° for 72 hours, shaken several times in the interval, after which the suspension was distributed in small test tubes and desiccated in vacuum over calcium chloride, sealed, and placed in the refrigerator. Sterility is always determined by culture. The small test tubes contain one dose each of 250,000,000 or 500,000,000 streptococci.

Our method of procedure is to inject each patient admitted to one of our two wards with an initial dose of 250,000,000 streptococci on the day of admission; seven days later a dose of 500,000,000 is administered, to be followed after another seven days, if the patient has not been released from quarantine, with a final injection of 750,000,000. The site for the injection is invariably the left side just above the crest of the ilium. The killed cultures are suspended in 2 cc. of sterile normal salt solution and injected subcutaneously.

Since the majority of our patients are admitted while in the acute stages of diphtheria, we cannot determine very accurately the degree of general reaction to the injections, as evidenced by the temperature, pulse, etc. With regard to the local reaction, we have found in practically all cases that the site of injection was slightly indurated and tender for a period of twenty-four to forty-eight hours. A few cases develop abscesses at the site of injection, but they can be accounted for as errors in technique.

Immunization was begun April 1 of the current year (1910), since which time 498 cases have been admitted to both wards; of these 143 have been injected with the streptococcus vaccine. Of the 143 injected, 4 cases have developed scarlet fever, as follows: Case "A", admitted April 4-'10, developed scarlet fever April 10-'10; case "B", admitted April 17-'10, developed scarlet fever, April 21-'10; case "C", admitted May 10-'10, developed scarlet fever May 13-'10; and case "D", admitted July 19-'10, developed scarlet fever July 25-'10. All cases of scarlet fever developing within six days following admission, and probably in the incubation stage of the disease when injected, seemingly substantiated Smith's opinion* that a relative immunity is established by the end of the first week following the first injection, while an absolute immunity exists after the third, and usually after the second, injection. As has been stated, the majority of our cases are admitted while in the acute stage of diphtheria, which fact renders it difficult to arrive at any very satisfactory estimate of the general systematic reaction

*Boston Medical and Surgical Journal, Feb. 24, 1910, page 243.

to the streptococcus injections, since these cases are injected with antitoxin at the same time, the reaction to which effectually clouds any reaction that might result from the streptococcus. Yet a fairly large percentage of cases do not require antitoxin, and from these we formulate the conclusion that, in the vast majority of instances, there is no very marked general reaction. This will appear from the following: 56.9% of cases required the administration; of these the temperature was increased in 36%, decreased in 48%, and did not change in 16%. The other 43.1% of cases which were injected with streptococci did not require the use of antitoxin, and resulted as follows: Increased temperature in 5.4%; decreased temperature in 86.8%; no change in 7.8%. When the second and third injections were given, no antitoxin was used.

Where 500,000,000 streptococci were injected, we obtained the following results: Temperature increased in 36%, decreased in 48%, no change in 16%. The injections of 750,000,000 increased the temperature in 9%; the temperature decreased in 75.7 %, and made no change in 15.3%

Smith* gives an interesting review of the use of this vaccine in Russia, where all the children in several of the small villages were vaccinated, following outbreaks of scarlet fever, with very encouraging results; the percentage of cases of scarlet fever in vaccinated villages ranged from no cases to 8.3%, while unvaccinated villages ranged up to 70.6% of cases of scarlet fever.

We have been unable in our short series of cases to find any contraindication to the use of the vaccine and regularly use it in cases desperately sick with diphtheria.

We may say, in passing, that the vaccine seemingly modified those cases of scarlet fever developing after the injection, inasmuch as our four cases were all of a very mild type.

While our observations as to the value of the streptococcus vaccine has not extended over a wide enough range of cases to form any very definite conclusion, we feel that the results we have attained justify us in continuing the work, especially since the Russian reports are so flattering as to the efficacy of the vaccine.

Our hospital is not the best place for experimentation in that we obtain a very meager history of the cases admitted, and, in a large majority of instances, are utterly unable to determine whether or not the children have had scarlet fever or have been exposed to it. The proper place would seem to be out in the field of the medical inspector who should use every endeavor to inject, with permission, every child in districts where scarlet fever makes its appearance.

* Boston Medical and Surgery Journal, Feb. 24, 1910.

The Massachusetts Association of Boards of Health

JULY—QUARTERLY MEETING

Boston, Massachusetts

The quarterly meeting of the Massachusetts Association of Boards of Health was held on Thursday, July 27, 1911, at the Hotel Brunswick, Boston, Dr. Henry P. Walcott, the President, presiding.

The following persons were elected to membership in the Association on recommendation of the Executive Committee:

C. Hammond, of Hanover.
A. R. Crandall, of Taunton.
R. D. Dean, of Taunton.
D. J. Mehegan, of Taunton.
W. J. Randall, of Chelsea.
G. B. Fenwick, of Chelsea.
E. C. Kelly, of Boston.
C. R. Felton, of Brockton.
H. N. Spring, of Leominster.
Pierre Brunelle, of Lowell.
A. C. England, of Pittsfield.
F. J. Hagan, of Chelsea.
P. A. E. Sheppard, of Boston.
Wallace Hatch, of Providence, R. I.

THE SCORE CARD SYSTEM OF DAIRY INSPECTION FROM THE NATIONAL STANDPOINT.

By Dr. GEO. M. WHITAKER,
United States Department of Agriculture, Washington, D. C.

The duties of the market milk section of the dairy division of the Bureau of Animal Industry are to study the sanitary production and handling of milk, to investigate problems of transportation and distribution, to examine ordinances, laws and methods of inspection, and then to disseminate this information by printed literature, correspondence, lectures, personal visits and suggestions, and exhibitions of various kinds.

This work is wholly educational. The dairy division has no police powers, and no authority for issuing and enforcing regulations. The federal government under the national pure food law, so-called, can prosecute those who produce or sell adulterated milk when it is an article of interstate commerce, but the dairy division has nothing to do with that law.

So far considerable of the work of this section has been in connection with the score card system of inspection. The dairy division does not claim authorship of this system, but yet is practically the father of it, having originated the movement which has made the system widely known and in general use. Representatives of the market milk section have visited the leading cities in the country, giving object-lesson demonstrations of the score card and explaining its use by illustrated lectures and otherwise. This is always done on invitation of the local health authorities and is purely educational or suggestive.

What is the score card system of inspecting dairies? It is, in essence, a system of rating dairies so that we can record and allude to their conditions in specific, exact mathematical terms rather than in vague generalities. To speak of a certain dairy as "good" or "bad" is usually meaningless, because there are many standards and many degrees of goodness and badness. A dairy that scores 70 (100 being perfect) is usually satisfactory. Certified dairies have scored as high as 95. Although there is a great difference between 70 and 95 this wide range of conditions can be classified in one group as satisfactory or good, while the score of each dairy tells its exact condition. The score cards in general use itemize in minute detail the various conditions necessary in producing milk,

assigning a certain number of points to each item. Each item is rated by itself independent of the others and the total gives the score of the dairy as a whole. The final rating is the sum of about 60 different judgments.

The score card system of dairy inspecting has made wonderful progress during the past few years. It is now in use by about 150 cities and large towns (for in many parts of the country milk legislation is purely a matter of municipal control.) It has been formally introduced by state officers as a portion of their system of inspection in fourteen states, and the recent sessions of the legislatures in Idaho and Utah adopted it in state enactments. Eighteen agricultural colleges give instruction in the best methods of securing better market milk and the score card system of inspection. Eleven large milk dealers use this system of inspecting the dairies from which they buy their supplies. Several of these dealers are located in Boston and they have done commendable work in improving the supply of the city.

The score card system of inspection has been the subject of several publications by the department of agriculture and is now generally recognized in dairy and medical literature. The Journal of the American Medical Association has spoken approvingly of it and at the Milwaukee meeting of the American Public Health Association, Dr. Thomas of the Baltimore health department said:

> "The sanitary condition of dairies and stores is best recorded by means of the score card system whereby a dairy receives a certain mark according to its merits, 100 for perfection being used as a basis for scoring. Of the cities replying to the questions 63% use the score card for dairy farms, 35% use them for local dairy depots and stores, and 30% use them for all inspections. It is due to the efforts of the Dairy Division of the Bureau of Animal Industry of the United States Department of Agriculture that the score card is so widely used. Probably the best score card is the one adopted at the last meeting of the Official Dairy Instructors' Association. This card is self explanatory, applicable to all sections of the country, and its adoption by all dairy inspectors would effect a much desired uniformity in scoring by this method."

John Spargo, in his book "Common Sense of the Milk Question", alludes to the "bewildering increase" in the number of score cards and recommends a uniform standard. In a paper read before this Association at its January meeting, Professor Gunn alluded to the fact that at the present time there are various forms of score cards in use and said " it is difficult if not impossible to compare results of scoring in one city with those of another." The score card of the U. S. Department of Agriculture is the one that has been generally adopted and it is in almost universal use. In a few cases the Pearson or Cornell card, so-called, is still in use

and the Bordens have a form of their own. The Pearson card was devised years ago by Professor Pearson, now Commissioner of Agriculture in New York, and was an important progressive step, but Professor Pearson himself now endorses the standard national card. This card is the result of an evolution. Actual use in the field has resulted in changes from time to time, and while not yet perfect it is acknowledged to be the leading and best card there is. It is endorsed by the National Association of Official Dairy Instructors.

One source of apparent variation in the score cards in use is due to the fact that several cities are still using the earlier forms of the dairy division score card. Two of the first cities to adopt this system were Richmond, and Norfolk, Virginia, and they are still using the forms first adopted. Chicago is using another form but not the latest. Another cause of variation in score cards is due to changes made by local officers who think they can improve the standard card, and because of this we frequently find places using the federal score card system but with modifications. In some cases this is desirable; for instance, the monitor roof system of barn ventilation is not the perfect system in northern latitudes on account of its withdrawing air warmed by the cows' bodies at a too rapid rate, while under southern conditions such a system is unobjectionable. The health officer of the District of Columbia considers the health of the cows of so much importance that he has a separate card for this item and removes it from his dairy score card, which is otherwise the same as the national card. The standard score card allows two points for the thorough washing of utensils, two more if they are scalded, and one more if they are sterilized in live steam. This has been changed in Boston so as to allow the whole five points for "thoroughness of washing," giving nothing for scalding and sterilizing in addition to washing. Those of us who have had something to do with evolving the score card believe that the best way of handling milk and utensils is in a house or room devoted exclusively to dairy work and that washing pails and cans in the kitchen sink with the domestic utensils is not the ideal plan; consequently a point is allowed on the score card for hot water or steam "in the milk house, not in the kitchen;" but on the Boston card this clause is erased and a point is allowed for hot water or steam even in the kitchen. The standard score card allows three points for inverting utensils in pure air while drying and not in use, for the purpose of preventing contamination from dust and flies. On the Columbia, South Carolina, card the words "and sunlight" are inserted so that the three points are allowed for inverting the utensils "in pure air and sunlight". This would prevent the use of a modern sterilizer. Other variations could be mentioned. There is

therefore a superficial appearance of accuracy in Mr. Spargo's allusion to the "bewildering" number of score cards, though the national card is evidently the standard and is in general use. The growing desire for a uniform score card so that conditions in various places can be better compared with each other than at present will unquestionably increase and have a tendency to reduce the number of minor local changes, and to concentrate upon the Department of Agriculture card as a whole.

In addition to a uniform card, uniform methods of scoring are desirable, and to bring this about the dairy division stands ready to render what assistance it can in standardizing this work. Some places get pitched on too high a key and this is a common fault with inexperienced inspectors. While such high scores are as valuable as any for expressing differences between different dairies contributing to the same supply and for educating producers, they are worthless for purposes of comparison with other cities. A few reports come to me in which many of the dairies score in the 80s and 90s. Such results are always to be viewed with suspicion, for dairies entitled to such high rating are few and far between. I found an average of 40.06 in an investigation of the Chicago milk supply, and taking the country over I imagine that that figure would come nearer to expressing average conditions than the higher ones.

The comparison of average scores of different cities may be improperly used, as for instance where health officers and newspapers do not care how bad local conditions are, provided they are better than the conditions in a neighboring city; when a person is downright filthy it is nothing to his credit that a neighbor is even dirtier. But there can be an advantage in studying relative conditions. Such an investigation gives the health officer a broader view of his work and of the local situation, and tends to restrain yellow journalism—where it exists—from exaggerated, one-sided or hysterical statements. As an illustration:—The condition of dairies supplying milk to Boston is represented by the figure 45. The condition of the dairies furnishing Chicago's supply a year ago was represented by 40. I recently visited a number of dairies in Lancaster county, Pennsylvania, and found an average condition represented by 39. A large number of inspections in a prominent city in the middle west gave an average of 33. The first thorough scoring of Richmond, Virginia, dairies resulted in an average score of 36.4. The Louisiana State Board of Health recently scored 345 dairies supplying 51 towns; the average of the highest scores was 44.4, of the lowest 17.2, and the general average was 31.6. This comparative information is interesting and valuable. It shows that while the Boston supply needs to be greatly improved before it can be called satisfactory, it does not merit unqualified condemnation and has many

commendable features. This statement is further emphasized by the fact that in the Chicago case 12% of the dairies were below 30, while in Boston less than 3% were in this low class.

From the standpoint of the health officer the score card system brings results in the shape of improved dairy conditions and brings these results quicker and easier than do other systems of inspection. The files of cards that have been filled out give volumes of information and make admirable office records. In the larger cities where many inspectors must be employed some of whom may be less thorough than others, this system furnishes a good method of following their work; if the inspector is required to leave with each dairyman a carbon copy of his score there is a strong probability that the dairy was actually visited and that some attention was paid to each item on the card.

From the standpoint of the producer the system has marked advantages. He can feel that he has received an accurate and impartial score, for with everything written down in black and white the opportunities for error and favoritism are small. If the inspector has tact and talks over with the dairyman the various ratings on the card and the reason for the score he makes, the dairyman becomes interested and is helped by means of the card. If the inspector has sufficient skill to make not only a reasonably accurate score but also some suggestions, he becomes a friend and helper of the dairyman and his visits are looked forward to with satisfaction. The score card system is simple and easily understood. In some places the health authorities have made too many and too complex regulations. They have studied what is necessary in the production of sanitary milk and then have embodied these essentials in a dairy law. If such a code were literally obeyed it would result in perfect milk, which is impossible and the health authorities know that the law will not and cannot be enforced. The dairyman however looks at the formidable code of fifteen to twenty pages with feelings of perplexity and irritation, knowing that he cannot comply with its requirements. Rating a dairy according to its merits does away with this irritation, and as the dairyman makes improvements he has the satisfaction of seeing his score increase. The score card protects the dairyman from the faddist who can see nothing but the tuberculin test, a cement floor, or white milking suits.

The score card tends to prevent misunderstandings, to bring nearer together health officer and producer, and to do away with the feeling that the inspector is out to interfere with the milk business and to demand expensive changes. The relations between producer and inspector should be such that the visits of the latter may be desired and even anticipated

with pleasure. The health officer of Indianapolis, Indiana, says he is frequently called on the telephone by dairymen who desire to have an inspector sent to their premises, having made some improvement for which they desire credit on their score card.

Investigating conditions in different cities is interesting from the standpoint of a study of human nature, which is similar everywhere. All milk producers are in a general state of unrest and feel more or less antagonism towards health officers. I recently came across a newspaper article containing the following sentences:—"There is danger of a milk famine owing to the strictness with which the sanitary authorities are enforcing the so-called pure milk regulations" * * * "The crusade for germ-free milk has been so vigorously pushed that the price of the bottled product has gone up two or three cents a quart in the last few years." * * * "Dairy herds are rapidly and considerably decreasing under what the farmers call the incessant harassment of the milk inspectors." * * * "Thousands of unjust convictions have been recorded against dairymen owing to the variability of fat in pure milk, for which the cow and her Maker alone are responsible." These complaints do not come from Massachusetts or any other state in this country, but from London, England.

Part of the trouble between producers and health officers arises from the verbose, drastic, or impracticable, laws which exist in some cities. The ordinance of a southern city says that all stalls and dairy premises "shall be kept in absolutely perfect sanitary and hygienic condition"; that the milk depots shall at all times be kept "immaculately clean" and that the health officer shall have power to adopt such regulations as he may deem proper and necessary "to compel perfect hygienic and sanitary conditions." The reaction from unwise laws unwisely enforced sometimes has led milk producers to deny universally recognized principles of science. A grand jury of milk producers in Kane county, Illinois, in their report to the county court reported a resolution to the effect that the tuberculin test was worthless and the judge ordered the resolution spread upon the court records. Another cause of friction between milk producers and health officers grows out of the changing definition of the word "clean" which producers do not fully understand. At a recent meeting of the producers for the Boston market a resolution was adopted calling attention to "the proverbial neatness of the New England farm family." That which was called clean a few years ago may be considered untidy today. The methods of the "clean" surgeon of half a century ago would convict him of malpractice today. In domestic work the feather duster age has passed, to be succeeded by the vacuum cleaner age in which the dust is sucked into

a removable receptacle and taken from the room. These changing ideas as to cleanliness should be explained to the milk producers. The work of improving the city milk supply should be largely educational.

The tendency to agitate for unsound laws is not confined to any one locality. At a recent session of the Indiana legislature a law was passed prohibiting the state veterinarian from applying the tuberculin test to any animal unless there was physical evidence of the existence of tuberculosis. The law also provides that if the owner of cattle objects to the state veterinarian's claim that there is physical evidence of the disease, the veterinarian can "call two farmers from the township whose judgment with reference to whether such cattle have physical evidence of tuberculosis or not shall be final."

Another common condition which knows no local limits is the existence of more or less sensationalism in the daily newspapers which exaggerate and misrepresent bad conditions, unduly alarm the consuming public, tend to injure the producers, and sometimes embarrass the health officer who is making progress that is all the more sure because it is somewhat slow.

One of the difficult things in connection with my work is to express conditions accurately and judicially without giving an opportunity for sensationalism and one-sided attacks on producers, dealers, or health officers on the one hand, and on the other without lulling a community into apathy and a false sense of security because conditions are relatively creditable, and without aiding the development of a foolish local pride because some other city has inferior conditions. A man toiling up a hill may be far distant from the top with a great deal of hard work before him, others may have advanced further than he has, and still he may be entitled to much credit for the progress he has already made, and for the effort he is putting forth to advance still higher and because he is ahead of many. Words of such extremely opposite meanings as up and down can be applied to him, depending upon whether we look down upon the toiler from a position above him or gaze up at him from the foot of the hill. A mathematical statement—like the figure on a score card—telling precisely how far one has advanced, is the only satisfactory and accurate way of describing his position.

STERILIZING STATIONS IN DAIRY DISTRICTS.

By Dr. CHARLES E. NORTH,
30 Church St., New York City.

I believe the people of this country have been educated to the point where they desire to have better milk. Many of the plans which have been proposed for securing this milk have as their basis the transformation of the dairy farmer into a sanitary expert. I maintain at the outset that the present generation of dairy farmers cannot be transformed into sanitary experts by any method whatsoever. It may be that that portion of the next generation of dairy farmers graduating from agricultural colleges may be fitted to be entrusted with delicate bacteriological operations similar to those of a surgical operating room, and that they will posses a knowledge of sterilization and antisepsis which will protect our milk supplies from heavy bacterial contamination; but one who is familiar with the present nature of the average dairy farmer knows that these men are not fitted to be entrusted with such operations.

I do not desire to minimize the value of the score card system or of inspection; in fact, I believe that the use of these two methods represents perhaps the utmost that public health officials can do today to bring about the desired reforms.

Among other methods which have been suggested to remedy present conditions the most conspicuous are those of the certified milk commissions. These commissions have demonstrated by several years of evidence that their proposition is one which gives us the most ideal milk, and it is certain that the certified milk of today represents about the acme of milk perfection; but I assert that no one can imagine it is a possible thing for the mass of our dairy farmers to become certified milk producers. There are a number of reasons against such a proposition as this. In the first place they have not the intelligence, and in the second place they have not the capital. If we want to look for a further reason we must turn our eyes toward the market and admit that the mass of milk consumers will never pay the price for certified milk.

In a situation of this sort it looks to me as if we were blindly urging our reforms unless we are prepared to step forward with some practical method for milk production which is feasible for adoption by the masses of milk producers, and which will give us clean milk at a price that is within

the reach of the masses of milk consumers. It is a fact that there are really only two parties to this milk contract; one is the milk producer and the other is the milk consumer. The large milk dealer is a necessary evil. He really represents an express company, a means of collection, transportation and distribution; he has little to do today with milk production as a whole. Physicians and health officers are not really parties to the contract. The party of the first part is the milk producer, the party of the second part is the milk consumer; and the reform for which we are looking must be something which is satisfactory to the principals.

Pure milk production is really a commercial proposition. Any plan to improve quality which does not carry with it an increase in price does not correspond with the well known laws of economics. For the health officer to urge upon farmers the necessity of improvement in quality, without pointing out to the farmer any hope for an advance in price, is not a common sense thing from a business standpoint. I assert, therefore, that we must expect to pay better prices if we expect to have better milk. What we all want to know is, how much better must our milk be to be fit to use, and how much is it going to cost us? That is the question that I, with a number of associates, have set myself to solve.

Eleven years ago I bought a farm and devoted myself exclusively to the production of certified milk. Among other facts which I discovered was the important one that I could produce good milk in old barns. After having spent many thousands of dollars in building ideal sanitary dairy buildings I was amazed to find that I could produce a milk in some of the oldest buildings on the place just as good, so far as the laboratory analysis showed, as I produced in my up-to-date buildings. It was purely a question of how clean the man himself was, and how clean he kept his building; I therefore made up my mind that milk reform lay along those lines.

If one stops to think he will realize that a cow may be standing in a very dirty barn, she herself may be very dirty, and yet a little calf will run in from outside, and provided the cow's udder is fairly clean, that little calf will take his dinner and trot out of that barn with certified milk in his stomach. The reason why the calf is able to do so is because he has a very small mouth, and because he brings that small mouth very close to the source of supply. We can imitate that procedure by constructing small metallic mouths and bringing them very close to the udder; and that perhaps is the most important single step in sanitary milk production.

Very few people know how to use covered milk pails. I have been to certified daries and found men milking into covered milking pails with the pail two feet away from the cow. They don't realize that the nearer they

get the mouth of the pail to the udder the more dirt you are going to keep from falling into the pail.

In the long list of sanitary precautions which we find on our score cards we should distinguish between those which are of primary and those which are of secondary importance. I don't want to say that we should neglect anything of importance, and I don't want to say that we should not ask our dairy farmers to do everything that they ought to do; but I do say that if you can get them to do two things; first, to milk into sterile, covered milking pails as close to the cow as they can get them, and secondly, to ice their milk, you will secure a milk that is many thousands per cent. superior to the article that is being produced today, at a very slight additional cost.

Armed with the facts which I learned during my five years' experience in dairying, I came to New York and after several years of agitation interested the New York Milk Committee in raising the necessary funds to try out my scheme. They raised the money and organized a little milk company which bought an old abandoned creamery at Homer, N. Y. This creamery has been thoroughly equipped for the sterilization and washing of milk utensils, and for the cooling and bottling of milk. We have a bacteriological and chemical laboratory in the creamery. Instead of the ordinary creamery man we have a trained bacteriologist in charge. The farmers looked askance and with much misgiving and with some ridicule at these preparations, but after we had held a meeting and offered them premiums in return for following our rules of milk production they began to drift in our direction. The very first day three farmers agreed to produce milk for us and at the present time we obtain our supply from twenty farmers.

We don't ask these farmers to do very much. The trouble with all former attempts to produce good milk, as I have already hinted, is that too much has been asked of the farmer. Our idea has been to leave farming to the farmer and put dairying in the hands of sanitary experts. Don't ask the farmer to become a sanitary expert; bring your sanitation to him, control it, and supervise it and leave to him just as few operations as you possibly can. The next generation we may make responsible for a little more, but we don't ask this generation to do anything but to raise the crops and milk the cows. All dairy operations are performed by ourselves.

We don't use their polluted water supplies. I was somewhat amused at certain health inspectors when they attempted to score the dairies which supply us. The first thing they did was to score the water supply on the farms. I objected at once, as these wells were not used in connection with our milk supply. I believe nearly 60 per cent. of the dug wells

on dairy farms are polluted. I maintained that all of these farmers should receive credit for our artesian well, which was located at our central dairy house, and which was the only water used in connection with the industry with the exception of the water the cows drank. There was also trouble when it came to the question of scoring the milk houses of these farmers for our milk house was their milk house.

Our scheme is one which makes the general arrangement very similar to that of a large certified farm, where there is a central dairy house with barns scattered at intervals, except that our barns have line fences between them and are on different farms. Our shipping station is a central dairy house to which all of the farms act as tributaries.

In order to secure a sufficient supply of the right kind of milk, we offered our farmers one-half cent per quart advance over the local market price for supplying milk from tuberculin tested cattle. That part of the country has been opposed to the test for tuberculosis, because the farmers never could see where there was any money in it for them, but this offer of half a cent per quart, when they came to figure it up, seemed to pay them for the loss of some of their cows even if the state did not reimburse them. Fortunately for our proposition the state has paid them in addition, so that one farmer actually tells me that one of the most profitable things he ever did was to have twenty-three cows slaughtered for tuberculosis, since he received payment from us and from the state also. The advanced price received for his milk more than paid for the slaughter of these cows.

In addition to the premium for tuberculin tested cattle, we pay a premium of a quarter of a cent per quart for what we call sanitation. Sanitation includes, first, milking into the sterile, covered milking pail, second, cooling of milk with ice. Either this milk has to be cooled by the ice supplied by the farmer himself, or we will supply ice to the farmer at cost, or he has to bring his milk to us immediately after milking—in which case we cool it at our central station.

We have also offered our dairy farmers a premium for all milk which tests below 10,000 bacteria per cc. We found that this was perhaps one of the most valuable premiums offered. In offering it to our dairymen it was with the distinct understanding that they would share the premium with the men who milked the cows. One dairyman afterwards said that he had often told his men to wash their hands, and had often urged them to wash the udder and flanks of the cow. When they knew he was coming they usually did so, but never before in the history of his dairy had he any guarantee that they did so when he was not there. After his first month's work with us this man's premium for low bacterial counts was $36; he kept $18 and gave the other $18 to the three men who

milked the cows. He now knows that his men wash their hands even when he is not around. This shows conclusively that you must reach the man who milks the cow. The visit of an inspector to a dairy farm once a month furnishes no guarantee that during the other twenty-nine days in the month the men are going to follow ordinary precautions of cleanliness.

The man in charge of our plant informed me that the majority of our dairymen were producing milk with a bacterial count of less than 10,000 bacteria per cc., and that he could not get them any lower. Believing it possible to secure a still better milk we offered an additional and final premium to the man who had the lowest average number of bacteria per cc. during each month. As soon as we took this step the average number of bacteria in the milk to the month began to go down, and there is now each month a very warm contest between these different farmers as to who shall be the winner of this special premium.

At a recent meeting of the farmers who supply us with milk they all asserted that they were willing to do whatever they were asked to do in the way of sanitation provided they could see some financial return therefor. They disclaimed any credit for being philanthropists, stating that they were not interested in the infant mortality in cities, but only in the infant mortality on their own farms. The majority did not believe in bacteria, never having seen any, but they were willing to take our statement regarding bacterial counts and cleanliness.

On the door of our building is a bulletin board. Each dairyman's name is in the first column, and the days of the month run along the top. Under each day is the bacterial analysis of each man's milk. At eight o'clock every morning there is a crowd around that bulletin board; the farmers are comparing notes and seeing who is going to make the most money during the month, and it is a fact that if a man finds his milk showed 1,000 bacteria per cc. on one day and 3,500 the next, he invades the office and inquires of the bacteriologist why it was that his count went up.

We have been operating for more than a year. We started with only 300 quarts a day and are now producing 4,000 quarts daily. When we started it was said that as soon as the hot weather came we could not continue to place low count milk on the New York market, because our milk is thirty-six hours old when it is delivered in New York. We purposely went to a part of the country 350 miles away, so that those who were likely to criticise us could not say that we planned to secure shipping advantages. Our milk is as old as any milk that goes into New York City, but during the hottest week in July we still maintained our average bacterial standard, which is less than 30,000 per cc.

All of our morning's milk is brought to our station hot. The reason it is not cooled is because we want it as soon as possible and we cannot wait to have it cooled.. We had been led to believe that milk must be cooled as soon as it is milked. Some of our milk is three hours old when it gets to the creamery. For the first three or four hours after milking the increase in the number of bacteria is so slight that as a general thing the morning's milk tests better than the previous night's milk. The previous night's milk is, of course, iced in every case.

We have penalties for those who fail to come up to our minimum standards. For instance we substract from a man's record if his bacterial count averages over 100,000. We also substract if his butter fat is below 3½ per cent.

The milk comes to our shipping station and is bottled and cooled there. It is then put on the train and shipped to New York, and most of it now is marketed at the thirty-one infant feeding depots maintained by the New York Milk Committee in the poorer parts of the city. The rest of it goes to one of the large milk dealers, who takes all of our surplus. The cost of this milk during this summer to these stores has been 7½ cents wholesale in bottles. One reason for this is that the officers are working without salary. I therefore don't want the large milk dealers to think that I maintain that this milk can be sold for 7½ cents, but I do say that all that it is necessary to do to find out what it can be sold for is to add to the regular fixed charges which are common to all kinds of milk those premiums that we pay to the farmers, plus the extra cost of operating our sterilizing station.

We know what that extra cost is. It costs us one cent a quart to operate the sterilizing station, now that we handle 4,000 quarts a day. To operate an ordinary bottling station in the country costs half a cent per quart; while to operate an ordinary shipping station, in which milk is shipped in cans, costs a quarter of a cent per quart. Therefore I think it is fair to add half a cent per quart to the cost of this milk for the surplus or excess cost of our sterilizing station over the cost of operating an ordinary bottling station. That makes a total of one and one-half cents to be added to the cost of this milk if it had been shipped in the ordinary way. It would cost one and one-half cents more than the cost of milk as it is ordinarily produced, to get tuberculin tested milk having an average bacterial count under thirty thousand per cc.

DISCUSSION.

Dr. Whittier. Without my knowledge or consent, a little more than four years ago I was elected milk inspector of the town of Brunswick, Me., where Bowdoin College is located. I started my official duty by visiting the dairies and by taking samples from the milkmen as they came into town. The first year the average bacterial count varied from down in the tens of thousands to as high as 27,000,000 per cc, but the average was over 1,000,000.

At my request, Dr. Whittaker, of the market milk division of the United States Department of Agriculture, came to Brunswick and visited every milk farm that furnished milk to Brunswick people, scored every dairy, and gave each milkman advice as to the best way of improving the character of his milk. The milkmen took the advice in good part, and all attempted to do something towards carrying out the things recommended. Dr. Whittaker focussed his advice especially on prompt cooling of the milk, and as a result most of the milkmen began to make arrangements to put in ice houses. The next year after Dr. Whittaker's visit the average bacterial count went down from 1,000,000 to about 700,000 bacteria per cc. The second year more of the dairymen put in ice plants and, also began to be more careful about handling their milk. As a result the average count for the third year went down to 14,000 bacteria per cc. Last year the state milk inspector came at my request, scored every dairy, and suggested further improvements. Last year's count was 94,000, showing in four years a gradual decrease from an average of over 1,000,000 to an average of less than 94,000 bacteria per cc.

In ferreting out the causes we have found many factors. The most common, I think, is the failure of dairymen to ice their milk. One man who had a persistently high count, cooled his milk in a large trough. He was a large producer, and put a good many cans of milk into this small trough. Thus, with a large bulk of milk and very little water, very little cooling took place, the temperature of the water soon reaching the temperature of the milk. Under these conditions the bacteria multiplied very fast. This man afterwards iced his milk, and his count then greatly improved. Very recently one man who had the highest score of any of the Brunswick milkmen, had at the same time the highest count. I found that the highest count of any of the twelve samples of milk that I took directly from the pail as each cow was milked, was 4,800 per cc., and the lowest count was below 1,000 bacteria per cc. From the faucets of his large mixing tank I obtained a sample of milk which showed a

count of over 3,000,000 bacteria per cc., which result indicated that the trouble was in this large tank. In fact the high count was due to the faucet, which had not been properly sterilized.

Dr. Kelly. The city of Fall River is supplied with milk by 550 dairy farms all situated within a radius of twenty miles of the city. We have but one man to score dairies and the most he can do is to visit each farm once a year. The board claims that this is entirely insufficient, since he should follow his first visit with a second in order to see that his orders have been carried out.

To have the suggestions in today's papers carried into practice we must convince the press, the taxpayers, and the general public, of the value of the statements made, else they are inoperative, since we cannot otherwise secure the men to carry them into effect.

In Fall River we are still suffering from the effects of the former practice of making political appointments in the health department of men without any information on health matters and without any previous training for the position they fill. These men cannot explain to the farmer why the scoring is done and are utterly incompetent for the position in other ways. Such men are out of sympathy with the clean milk movement, they don't believe in it, and they don't understand it. We were pleased recently when the employment of future inspectors was transferred to our Board of Health and classified under the civil service.

Dr. Brunelle. Assuming that milk is produced under improper conditions, but that it is iced properly within an hour after milking, will the milk show a fairly low bacterial count?

Dr. North. That would depend on the amount of dirt that got into it at the time of milking, and on the cleanliness of the milk cans and utensils. One of our farmers brought a can of milk to our station one day which proved to have 500,000 bacteria per cc. He was questioned very closely as to why milk in his other cans showed only 2,000 or 3,000 bacteria per cc. He admitted after a while that he had borrowed the first can from his neighbor, who did not have the same methods of washing and sterilizing cans as we had. Thus the difference in the bacterial content of this man's milk was due to the difference in the sterilizing of the cans.

Mr. Whittaker. The frequency with which dairy inspection should be made should depend to some extent upon the condition of the dairy. If the health officer cannot get all the inspectors he wants, I would suggest that the better class of dairies be let pretty much alone, even if they are not

inspected more than once a year; but the men whose score is in the twenties ought to be inspected once a week, if possible, until their score is forced up to forty or above. I agree most thoroughly with what Dr. North said, that with a small top pail held close to a fairly clean udder, and with the milk cooled promptly or taken promptly to a shipping station, it is possible to produce very good milk in very poor buildings, but the average producer will be more likely to get a good result with fairly clean buildings. While we never advocate any fancy buildings, we believe that as a mere matter of economy of labor it is easier to keep a barn clean that is fairly well constructed, and which has fairly smooth walls and sides, than a building full of dust catching projections, braces, and timbers. We recognize the force of what Dr. North has said about the arrangement of the score card, for on the side of the card headed "methods" sixty points are allowed, while on the other side, headed "equipment" only forty points are allowed, so that the card allows us to emphasize to the farmer just exactly what Dr. North thinks ought to be emphasized. We try to bring that out very clearly by the arrangement of the cards and by our methods of scoring.

Dr. Davis. Is it the policy of the U. S. Depatrment of Agriculture to work with a dairyman who scores but twenty-four in an attempt to have him increase his score by persistent effort, or is it better to say to such a man: "It is impossible for you to produce clean milk." If there is an arbitrary limit of the total final score in any case, what should that limit be?

Mr. Whittaker. That is another question that cannot be arbitrarily answered, but speaking in general terms it is my conviction that where a person is as low as the twenties, he is a rather hopeless case, and with such men the best way is to shut them out of the market.

Dr. Davis. Where do you think the line should be drawn below which there would be little or no chance of securing improvement?

Mr. Whittaker. It is hard to draw an exact line and say that everything one side of the line should be cut off and everything on the other side of the line should be labored with. Much depends upon the man, upon his natural appearance, and whether he appears to be intelligent and receptive. In the upper thirties, say thirty-five or thereabouts, I should think the chances are he might be a hopeful subject for improvement.

Dr. Osgood. I would like to ask Dr. North if he can suggest any application of his theories and principles to a local board of health of a city of about 100,000.

Dr. North. Since our sterilizing station has been operated we have received at least ten applications from local boards of health in cities of different sizes to coöperate with them in the establishment of similar sterilizing stations in their dairy districts. I believe that this plan would have to be modified somewhat to fit conditions in various places. I understand, for instance, that in Boston the larger part of the milk supply is put on the milk trains from ordinary station platforms to which it is brought by small dairy farmers. In other words, in Boston there are no creamery or shipping stations, such as we have in New York State. Over ninety per cent. of New York's milk supply comes to such shipping stations, where it can be cooled and bottled. It is at such stations that I maintain missionary stations for preaching sanitation should be established. A cardinal feature of the scheme is to take the sterilization of utensils out of the hands of the farmer.

Small towns, where milk is delivered by wagon, should have collecting places or stations to which the milk should be taken before it is distributed. In such cases it will be necessary to get either the local health officer to act as bacteriologist or to secure some other man for this kind of work, who appreciates the importance of sanitary measures, to act as supervisor for that city. I think that the main features of the idea can be modified so that they can be used in a town of almost any size.

PASTEURIZATION OF MILK IN THE SEALED AND FINAL PACKAGE.*

By J. C. CARTER,
Boston, Mass.

Pasteurization of milk is heating it to such a degree of temperature for such a period of time as to kill the vegetative forms of bacteria. Pasteurization is not sterilization, as the temperature employed is not sufficient to kill all bacteria, particularly spore-bearing organisms. While many different methods have been devised for accomplishing pasteurization of milk, it has been employed to give various results.

In order to determine the thermal death point of a living organism, two factors are of importance: (1) the temperature to which it is exposed and (2) the length of time of the exposure. Thus, according to the determinations of Theobald Smith, we say that 60° C. for fifteen to twenty minutes will kill the bacillus of tuberculosis if moisture is present. These two factors have been recognized in pasteurization and one method which is known as "the flash process" exposes milk to a temperature of about 180°F. for a fraction of a minute, while in another process the milk is held for twenty to thirty minutes or even longer at a temperature of 140° to 160°F. In this country these degrees of temperature and periods of time of exposure have had as their object the exposure of the largest amount of milk for the shortest efficient time at the highest temperature that will not affect the taste of the milk nor destroy its cream line. To the various methods of pasteurization different names have been given such as "perfect pasteurization", "pasteurization by the holding device", by "the flash process", and others. According to most systems now employed, milk is first pasteurized and then bottled. In most places there is no official control over pasteurization, the public not being guaranteed that the milk has even been pasteurized nor that it is pasteurized according to the method or exposed to the degree of temperature or for the length of time that is stated by the seller of the product. Moreover, probably a good deal of milk is bought by the public under the impression that it is normal milk when it has been pasteurized. It should also be noted that all the devices used for pasteurization are so arranged that the machinery can be

* Under supervision of the Boston Health Department.

so set that the milk is heated to a higher or lower temperature for a longer or shorter period of time than it is represented to be, and also different from what the contractor may wish it to be.

If we consider the various purposes for which pasteurization is employed we observe that the object may be broadly divided into two classes: (1) pasteurization to kill the pathogenic organisms that may be present in the milk and (2) to render salable certain milks that otherwise might be barred because of excessive numbers of bacteria, or else to make bad milk appear as good milk because of a low bacterial count. Of these the first is the legitimate, the second the fraudulant use of pasteurization.

As the result of some agitation, the dairy in which I supervised pasteurization in the final package during the past month was persuaded by scientific people who were really trying to get a good quality of pasteurized milk, to experiment with a system of pasteurization with only the legitimate object in view. To accomplish this various steps have been taken. In the first place a portion of the same raw milk which has to meet Boston's requirement of less than 500,000 bacteria per cc. is drawn into separate bottles capable of being sealed with a crimped metal-capped cork seal, similar to those ordinarily used on beer bottles. The bottles are then sealed and heated to a temperature of 150°F. for thirty minutes, as will be described later. This heating is done under my supervision as an inspector of the Boston Health Department. After I have seen that the milk has been heated to this degree of temperature and for the required time, I tag the bottles of milk as "pasteurized". In this pasteurization the following requirements are met: Milk, which without pasteurization meets the city requirement as to numbers of bacteria, is pasteurized in the sealed package, and this milk is never again exposed to contamination until it reaches the consumers. The consumer is also guaranteed that the milk has been exposed to the degree of temperature for the length of time that is stated on the label.

The process is not as simple as might at first be thought. Merely to tell the producer of milk to heat for thirty minutes at 150°F. does not at all solve the problem. Especially is this true in the sealed package. Until it became possible to put a seal of the type just described on a large-neck bottle the method would hardly have been feasable. Even with the large-neck bottle the expansion of the milk when heated is of importance. It has been found that an air cushion of some two per cent of the total volume is necessary. It is also to be noted that bottles of cold milk cannot be suddenly exposed to 150°F., and that the milk in the bottles does not reach a temperature of 150°F. when the water surrounding them does. The following method was improvised to meet these conditions:

The returned bottles, except the especially dirty ones, together with the new ones are transferred to a special rack holding twelve bottles. This rack is then started into the washing machine in such a way that the bottles are upside down. This machine is divided into three compartments. When the rack containing the bottles reaches the first compartment, which contains water heated to 120° to 130°F., together with washing soda to cut the grease, jets of the solution are shot into the bottles from a force pump. The rack of bottles then drains and it is immediately passed on to the second compartment where the bottles are rinsed by jets of water heated to 170° to 180°F. The force used in each compartment is just below that necessary to blow the bottles out of the racks. The bottles, when they reach the third compartment, are blown full of, and are surrounded by, jets of live steam. The rack of bottles when it comes from the machine is allowed to cool. From this rack the bottles are transferred by simply turning them out into the filling rack. The total time required is four minutes. The machine holds in each compartment two racks at a time, one being advanced half its length over the other. The especially dirty bottles are washed by hand after which they are run through the machine. The racks used during town delivery are washed by hand and are immersed in hot water for five minutes.

The filling of the bottles is accomplished by the regular machine employed for this purpose. A small amount of milk, some two per cent., is removed from each bottle by means of a gauge which has been thoroughly sterilized with live steam, in order that when capped an air cushion may be formed, against which the milk can expand when heated. The bottles are now capped by a special machine which fastens on a cap similar in type to the caps used on beer bottles. The bottles, in wire holders containing six each for easy handling, are then removed to the room where the water vats are installed.

These vats have a false slat bottom which keeps the milk bottles some three inches, more or less, above the real bottom, allowing a free circulation of the steam and water. When ready for use the vats are filled with water which is then heated to about 118°F. The milk at the time of bottling is between 50° and 60°F. Through a tight fitting cork a thermometer is inserted well down into one of the filled bottles. Into another bottle a thermometer is inserted in a like manner only this time the bulb is kept well up in the neck. One of these bottles is placed at one end of the vat and the other bottle at the opposite end. This is the arrangement for each vat. Live steam is allowed to run into the vats through a pipe pierced with numerous holes which is in the center of the vat and beneath the false bottom. Readings of the thermometers in the water and in the milk

bottles are taken every ten minutes until the water reaches a temperature of 150°F. When the water is heated to this temperature the steam is shut off, for the water is never allowed to rise over 153°F. By this time the temperature of the milk is 135° to 140°F. Readings are now made every five minutes and the water is kept moving so that no jackets are formed about the bottles. The caps have by this time become convex, the small amount of air in the bottles having been expelled in bubbles, so that the milk now completely fills the bottles. In a few cases there may be a little milk expelled by the expansion because of the lack of a sufficient air cushion.

When the milk reaches a temperature of 150°F., which is some fifteen to twenty minutes after the water has reached this temperature, the time is carefully noted. The water temperature is then maintained at 151° to 152°F., depending upon the way the vat has heated and upon the loss by radiation. After the milk has been held at a temperature of 150°F. for thirty minutes and a few seconds over, the water is drawn off. While the water is running off, the printed tags which are kept locked up under my own supervision are tied on the bottles. Only enough tags are counted out and brought down for the bottles that have just been pasteurized. The use of these tags will be discontinued when printed seals have been received. When the water has been drawn off to the level of the false bottom cold water is allowed to run in. By this means the heated bottles are tempered so that they do not crack when later on they are thoroughly cooled. The seals are now concave showing that a vacuum exists within the bottles. If any cap did not show a concavity the bottle would be rejected, but up to the present time none have been found. Later on ice is added to the vat, and the bottles, after cooling, are racked and removed to the car. The vats are then cleaned and made ready for the next day.

Measures of safety against fraud can be summed up in the following points: (1) the use of a bottle differing in shape from that used by this dairy for its raw milk; (2) the use of the cap which can only be put on by a special machine made for this purpose; (3) the inspection of the bottling room to see if all the sealed bottles have been removed; (4) the removal of the extra caps from the machine; (5) the counting out and putting on of the printed labels by myself or at least while I am present.

The results that have been obtained by this method of pasteurization have been very satisfactory. During the month of July, 1911, while I have supervised pasteurization at this dairy, I have been working with Dr. E. H. Schorer in the laboratory of the Department of Preventive Medicine and Hygiene of the Harvard Medical School on the efficiency of the method. We have found that the bacterial counts in the raw milk

from this dairy as delivered in the city to its customers vary from 12,000 to 50,000, while in the pasteurized milk the counts have run from 800 to 6,000 as delivered, showing an efficiency of about 90 per cent. When kept at 40° F. the bacterial count on pasteurized milk increases from 6,000 to 1,120,000 in fifteen days if the bottle is shaken on receipt. When kept at 50° to 60° F. the bacterial count increased from 3,500 to 6,000 in twenty-four hours and to 44,000 in seventy-two hours and the milk was sour in one hundred and forty-four hours. When kept at room temperature the count increased from 6,000 to 19,200,000 in twenty-four hours and the milk was definitely coagulated. At 100° F. the milk was coagulated in twelve hours.

Whether 150° F. for thirty minutes is the best degree of temperature and length of time of exposure has not been fully determined and it is very likely that the whole question will have to be investigated for pasteurization in quart bottles. However, it has been determined that not all types of ferments are destroyed. There is no cooked taste to the milk. To the palate it seems to be somewhat richer but the cream line is not nearly so visible as it is in the raw milk.

The milk seems to coagulate on ageing and putrefaction does not appear to occur any earlier or more frequently than in other milks.

The particular process of pasteurization outlined is only temporary, for already steps have been taken to install a continuously working machine, but even by the method employed during the past month it would have been possible to pasteurize relatively large quantities of milk in the final package.

My thanks are due to Dr. E. H. Schorer, of the Department of Preventive Medicine and Hygiene of the Harvard Medical School, for his criticism and help in preparing the material for this paper.

Notes and Reviews*

PUBLIC HEALTH NEWS AND NOTES

By B. L. ARMS,
Boston, Mass.

New Health Regulations in Louisiana.† Among the regulations passed by the State Board of Health during the past few months are: Abolition of the public drinking cup; regulations for the screening of all food stuffs exposed for sale; abolition of the common roller towel; provision for antitoxin for the worthy poor and the tuberculin test for all dairy herds.

Health Exhibit Train.† Dr. Oscar Dowling, President of the Louisiana State Board of Health, last November started a campaign popularly known as the "Gospel of Health on Wheels."

The train consisted of two coaches, loaned by the railroad, and a Pullman. These cars were transported free of charge by the railroads. One of the coaches contained exhibits relative to many infectious and contagious diseases, arranged with special reference to their educational value. The following were dealt with: Tuberculosis,—human and bovine, typhoid, smallpox, hookworm, pneumonia, gonorrhea and syphilis. The principles of oral hygiene were also illustrated.

The second car contained models ranging from a dairy and slaughter-pen to household utensils.

The third coach was a Pullman owned by the Board of Health and utilized as a home by Dr. Dowling and his associates. The name of this car "Educational and Inspection" conveys the entire story.

The work as a whole was organized into five divisions, each in charge of an expert. Most of the inspecting was done by Dr. Dowling who, in seven months, visited 358 dairies, an equal number of slaughter-pens, markets and bakeries, hundreds of restaurants, hotels, drug stores and school houses, and every court house and jail in the state but two. Dr. Dowling thus knows from personal observation the sanitary condition of every city and town in Louisiana. Lectures were given both day and evening.

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

† From notes furnished by Agnes Morris, Baton Rouge, Louisiana, State Organizer School Improvement Leagues.

The record shows that about 300,000 people saw the exhibits and heard the instructions relating to them; that 200,000 attended the evening lectures; and that many thousands of women and children attended the morning and afternoon lectures. The visit of the train with the exhibition and lectures, by creating a desire to clean up, accomplished its purpose.

At the close of the state campaign, during which they traveled 7,000 miles, they still had a mission to perform and responded to an invitation of Dr. W. A. Evans, Chairman of the Section on Public Health of the American Medical Association, by taking the exhibit to the annual meeting at Los Angeles. The larger cities visited were: San Antonio, El Paso, Los Angeles, San Francisco, Salt Lake City, Omaha, Denver, Chicago, and Memphis. The routes followed were over the Southern Pacific, Union Pacific and Illinois Central railroads which furnished the transportation.

The health exhibit train will be remembered as one of the most successful incidents in the new movement for sanitation

The Right Way*. The following notice from the Kinston Free Press is reproduced to illustrate what we think is the proper way to handle the smallpox situation where the local authorities are afraid to pass a compulsory vaccination ordinance:

SMALLPOX IN TOWN.

"We hereby give notice to the citizens of Kinston that Rev. A. H. Butler, residence Tower Hill Road, has smallpox. The last Legislature repealed the quarantine law as to smallpox and made no provisions for free vaccination. The law was repealed at the suggestion of the State Board of Health, the reasons being: First, that the cost of quarantine was too great, the same costing the State over one hundred thousand dollars a year; that quarantine gave to those who did not care to protect themselves by vaccination a feeling of security. It has been demonstrated hundreds of times and in hundreds of places that vaccination secures immunity from smallpox. A well cared for vaccination gives the individual very little inconvenience. All those who desire protection can get it. Those who do not can take their chances.

(Signed), A. L. HYATT, City Physician."

This is certainly straight from the shoulder and puts the question squarely up to the people.

Hookworm and its Prevention. The August Bulletin of the North Carolina Board of Health is a symposium on hookworm disease and shows not only what has been done, but what is even more to the point, what can be done anywhere.

* Bulletin of the North Carolina Board of Health, April, 1911.

DATA FROM WATER PURIFICATION WORKS—May, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins. Settling Basin: Period in Hours	Settling Basin Effluent: Turbidity	Settling Basin Effluent: Bacteria per c. c.	Coagulation Basin: Period in Hours	Coagulation Basin Effluent: Turbidity	Coagulation Basin Effluent: Bacteria per c. c.	Parts per 1,000,000. Unpurified Water: Turbidity	Unpurified Water: Color	Unpurified Water: Total Hardness	Purified Water: Turbidity	Purified Water: Color	Purified Water: Total Hardness	Nos. of Bacteria per Cu. Centimeter: Unpurified Water	Nos. of Bacteria per Cu. Centimeter: Purified Water	No. of Deaths from: All Causes	Typhoid Fever	Pulmonary Consumption
Albany, N. Y.	100,700	Hudson River.	16 rapid sand, 8 slow sand Filters and Disinfection.	22.8	2.4	17.	7	18,500	Combined with the sedimentation.			9	28	71	0	17	71	23,300	11	154	0	25
Cincinnati, O.	364,463	Ohio River	Rapid sand filters using lime and iron as a coagulant.	49.3	4.1	48.	18	665	10	12	165	55	...	78	0	...	83	2,090	13	521	1	98
Columbus, O.	181,511	Scioto River	Water softening and mechanical filtration.	15 7	1.8	18.	4	375	Combined with the sedimentation.			61	32	256	0	7	81	3,500	375*	170	1	22
Harrisburg, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	8.5	1.4	6.	*...	....	1.5	....	28	24	4	35	0	0	37	5,293	18	95	1	5
McKeesport, Pa.	42,694	Youghiogheny R	Water softening and mechanical filtration.	4.0	0 6	20.	...	2	Combined with the sedimentation.			...	...	190	0	0	84	432	1	51	0	3
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using lime and iron as a coagulant.	14.4	0.8	4 5	425	1,800	12	40	100	475	10	...	0	4	...	2,200	21	643§	9§	72§
Toledo, O.	170,000	Maumee River	Mechanical filtration.	17.2	2.5	7.5	8	402	Combined with the sedimentation.			82	40	...	0	10	...	4,850	82	206	0	...
Washington, D.C.	348,460	Potomac River	Sedimentation with slow sand filters.	63.0	0 5	96.	10	109	..	..	..	10	0	...	0	0	...	230	8	901	8	58
Youngstown, O.	80,000	Mahoning River	Mechanical Filtration, using Sulphate of Alumina.	8.8	4.0	3.	20	3,000	Combined with the sedimentation.			35	39	131	0	0	127	31,400	404	82	0	9

NOTE —*The high numbers of bacteria noted at Columbus were caused by "after-growths" following treatment with Bleach.
§Death records in New Orleans included "Non-residents."

W. R. Copeland, Columbus, Ohio, Reviewer.

[illegible]

WATER PURIFICATION PLANT NOTES.

W. R. COPELAND, Columbus, Ohio.
(*Reviewer.*)

The Importance of Enforcing Sanitary Laws and Regulations Relating to Public Water Supplies. Few persons realize that bathing in a lake or stream may pollute the water. A still smaller number believe that persons boating or skating upon lakes and rivers may also have the same effect. As a matter of fact, however, everybody who has bathed in lakes or rivers remembers, that the cool waters cleansed his perspiring body and washed the grime accumulated from the dusty street upon his legs and feet into the water. Not infrequently, too, the association of ideas or the change in temperature excited the kidneys and intestinal tract to activity, so that it was found necessary to urinate or deficate in the water or upon the banks of the swimming pool. Many fishermen boating upon the open waters or seated on the shore pass their idle time in chewing tobacco, and not having spittoons, spit into the water.

Stringent laws have been passed in many states to prohibit persons from dumping nightsoil upon the banks of water courses in order to prevent the spread of disease by polluted waters. Why, then, should not persons be prohibited from polluting water by bathing in it, or expectorating into it?

The Massachusetts State Board of Health and the Metropolitan Water Board of Boston thought that the matter was important enough to pubiish a set of rules and regulations for the sanitary protection of waters. Rule No. 14 of the edition of 1910 reads in part as follows: "No person shall bathe in * * * the Wachusett Reservoir, * * * or any other lake, pond, reservoir or stream used by the Metropolitan Water Board as a source, or for the conveyance, storage or distribution of the water supply of the city, town or water Company, etc. No persons other than a member of the said Metropolitan Water Board, its officers, agents or employes, or public officers whose duties may so require, shall, unless so permitted by regulation or permit of the said Board, enter or go in any boat, skiff, raft, or other contrivance, on or upon the water of any said

reservoir, etc. Persons convicted of violating the rules in force on the water-shed of the Boston supply are liable to a fine not exceeding $500.00 or to imprisonment not exceeding one year or both."

The State Board of Health of Maryland has also drawn up a set of rules to protect the water supply of Baltimore. Rule No. 10, reads: * * * "No person shall bathe, swim or wash in said reservoirs, nor in any influent stream within 500 yards of said reservoirs." The city water board passed some further rules of which section 902 reads: "If any person shall wilfully pollute the water in any lake, etc., or other work constructed or used for supplying the city of Baltimore with water, by swimming, bathing, or washing therein, or by washing, or causing to be washed therein, or so near thereto as to pollute the water therein, any clothes, etc., the person so offending shall forfeit and pay a sum not less than five nor more than fifty dollars for each offense."

Where people live inland and are not provided with natural lakes the bodies of water formed by impounding river waters for municipal supplies offer a strong attraction to camping or picnic parties, to fishermen, to summer cottagers and to trolley lines or land development companies.

The question has been raised in some quarters as to why rules prohibiting such a use of the water-shed and waters in public reservoirs should be enforced especially in cases where the cities are provided with efficient water purification plants. There are at least three answers to this argument:

The first answer is, that although the natural process of sedimentation tends to purify a stream during times of low water, following a drouth the heavy rains sweeping over the banks and through the sewers wash large quantities of filth into the streams and produce such currents that germs of disease may be carried down stream for 100 miles.

The second answer is, that an increase of pollution means an increase in the amount of chemicals required to purify the water, an increase in the wages for supervision over the plant, and an increased danger of typhoid epidemics in case of accident to the purification works.

The third answer is, that such sports as bathing, boating, fishing, swimming, etc., encourage children and other thoughtless persons to congregate on the banks or in the water with the result that two or three people drown in every such body of water each year. This last item is an unfortunate item at best but it may become more than that when, as in the case of Harper's Ferry, the water has to be drawn entirely out of the whole basin to remove the dead body of a drowned man. If such an incident

should happen in a very dry season it is probable that the reservoir would not fill up again for months, leaving the city without water for household use or fire protection, and force large numbers of people to resort to polluted wells for their drinking water. How common it is in winter time to hear of one or two skaters being drowned by breaking through the ice. It might be impossible to remove the body for several weeks if there was a little current flowing to carry it under the heavier layer, and in the meantime the people would turn with disgust from a source of drinking water polluted by a dead body.

Rules for preventing bathing, boating, swimming, etc., curtail the pleasures of few and protect the welfare of the whole community; therefore such rules should be enforced.

BOOK REVIEWS.

The Dawn of the Health Age. Benjamin Moore, M. A., D. Sc., M. R. C. S., L. R. C. P. P. Blakiston's Son, Philadelphia.

This is a most "quotable" book of less than 200 pages, in excellent, direct, terse English. It contains concise, frank, almost brusque formulations of the "medical reconstruction" ideas now seething, but uncrystallized and unorganized, all over the English-speaking world. Although applying more particularly to Great Britain, the principles discussed deserve the most careful consideration everywhere.

The author addresses himself "equally to conservative and liberal, to humanitarian and economist, to capitalist and laborist, to individualist and socialist." (The author does not, it will be seen, address the medical profession. He assumes, presumably, that the "bone of contention" itself is always interested in its own fate.)

A string of quotations will best show the character of this quite remarkable book. Thus: (the italics are ours)

* * * "Hundreds of thousands of lives and millions of money can be saved every year if disease is attacked on scientific principles instead of being dallied with as at present."

"The passion for drugging and doctoring the *individual* with specific cures and quack nostrums is one of the prepotent curses of our time, while the health and well being of the *species* * * * are neglected.

"At the present moment we possess sufficient knowledge of medical science to enable us to save at least three hundred thousand lives every year in this country alone, and the saving of these three hundred thousand valuable lives could all be effected without costing the nation a single penny, but rather at the same time many million pounds a year might be saved which under present conditions are absolutely wasted.

"In the face of all this spendthrift extravagance in lives and money, we eagerly call for more scientific research to enable us to cope with disease, utterly ignoring the rich harvest which medical science has already yielded ready to be garnered all around us.

"It is true that we are still ignorant of the causes and modes of propagation of certain diseases, and attempts to discover these are in themselves most laudable; but it is equally true, and much more important, that we do know perfectly how to combat some of the direct and most common diseases, and that we move neither hand nor foot to do so, but stand benumbed and useless, as if we were a race of savages without any polity or system of government or capacity for any concerted plan of action for the national welfare.

"The problems of disease, from which radically spring all the most important problems of social reform, require now to be tackled by statesmen, and not by doctors and scientists.

"The exponents of medical science have accomplished their aims in many important directions and have laid their results before the public; they can proceed no further without concerted statesmanlike action, and it is for the public now to awaken statesmen into activity."

* * * * * * * * * * *

"It is method more than money that we want in order to combat and conquer in our battles with disease; we must fight in the future by means of a disciplined army instead of, as at present, with an undisciplined mob, each member doing what is right in his own eyes and working at cross purposes to his neighbor."

* * * * * * * * * * *

"With a self-satisfied air we make survey of what we term the modern advances in medicine and surgery, *as applied to tinkering the diseased individual*, and complacently the credulous public swallows the glorification, while we slumber over the thousand-fold greater achievements possible to organized effort in the wholesale eradication of disease from the commonwealth. Meanwhile hundreds of thousands of the fittest of our citizens die yearly without one effort being made to save them.

"Naturally our organized army of doctors would have to be paid, and this would cost the nation eight to ten millions a year; but this money is all paid now, and more than paid. All that is necessary is to pay it through different channels, and the advantage gained is that we shall possess, as aforesaid, an army instead of a mob.

"Needless to say, no disrespect is meant to the medical profession by designating it as a mob. That term is only intended to signify that it is entirely lacking in the first elements of organization so far as dealing with the diseases of the nation is concerned, and preserving the nation in a fit state of health."

* * * * * * * * * * *

"Even if it set about reorganizing itself on new lines, the profession lacks those effective compulsory powers of dealing with disease which will be elaborated in subsequent chapters, and these only can be given to it by legislation.

"The problem of saving these hundreds of thousands of lives and millions of pounds of money annually is accordingly one for the public itself, led by those publicists who take an interest in medico-social problems."

* * * * * * * * * * *

In considering present systems (in England) of combating infectious diseases, systems far more developed than we have in this country as yet outside of a few of the largest centers, our author minces matters not at all. Thus:

"The Briton, in the opinion of some superficial critics, will become a slave under such compulsory conditions when his home—his castle of dirt, ignorance, and disease—is visited by the health officer, and so he is advised to fight to the last gasp against such inspection."

"Neither the medical practitioner nor the public health officer has any commission to go forth and find the disease, not even when an epidemic is on; no, the disease must come to the doctor. The enemy must walk past our outposts and into our camp, and ask to be attacked and arrested, before we stir hand or foot. Is not the whole thing too ludicrous for the serious consideration of anyone but the witch-doctor or medicine-man of a savage tribe? It is reminiscent of the days of burning for witchcraft or healing by incantations and charms."

* * * * * * * * * * *

"The patient reports to the doctor, and the doctor reports to the medical officer of health, and the medical officer of health reports to the infectious disease hospital,* and then, if there is room, the ambulance is sent for the patient. Meanwhile, the disease germs have not been reporting at all, but have been going on with their business, and next day there is another case to be removed from the same house or the house next door, after 'the tale of the house that Jack built' has been run through again. Is it any wonder that we have epidemics of acute infectious diseases?"

* * * * * * * * * * *

"The poor hard-working wife of the laborer, with all her family and housework to attend to, may be forgiven if she fails to understand even for two or three days that what she thinks is a cold or sore throat in one of her children is the beginning of a serious infectious disease, and there is no one going round inquiring for sick children in the houses, even when it is known that a severe epidemic is in progress. No; the free-born Briton must be allowed to infect his neighbors in peace, and undisturbed by any domiciliary visits of a health authority. He is not permitted to neglect the mind of his child, but he can practically neglect the body, and its care and requirements, to his heart's content."

* * * * * * * * * * *

* "And the parson told the sexton, and the sexton tolled the bell."

"The better circumstanced classes suffer less severely from infectious disease, not because they are immune, but because they are brought less in contact with it, in the first place; and, secondly, because they are better nursed and cared for when it falls upon them."

* * * * * * * * * * *

"As well might we send forth the privateers and letters-of-marque of Queen Elizabeth's time to fight the modern navy of our most powerful rival, as go on with our present equipment for offensive action against disease, and hope or pray for a victory.

"All honor to the wooden walls of England and to the memory of the brave men who fought within them, but their day is over; and all honor to our municipalities and medical officers of health, and the private donors who have supported our voluntary hospitals like the old privateers, and fought the good fight against disease in the face of long odds. But the day of these things is passing away. Science has shown us a better and more excellent way."

Our author then considers the evils of the present "lodge practice" system in England—probably greater there than as yet here; existing hospital systems (many of the criticisms here made do not apply to American hospitals of the better types at all); tuberculosis, in which emphatic demand for the *supervision of the infectious case*, rather than the cure of the incipient is made; and finally, a national medical service.

Whatever may be thought of the sociology or economics of Dr. Moore's plan, his knowledge of the demands of modern public health represent the very best modern teaching of our leaders in America.

H. W. Hill.

ISOLATION HOSPITAL, FORT WILLIAM, ONTARIO.

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SPECIAL ARTICLE

AN ISOLATION HOSPITAL BUILT AND OPERATED BY A CITY DEPARTMENT OF HEALTH.

By ROBT. E. WODEHOUSE, M. D.,
Medical Officer of Health, Fort William, Ontario.

Isolation hospitals are a most important part of the equipment of a city department of health. Facilities in such hospitals to quarantine effectively all people suffering from communicable diseases, and also to isolate perfectly one form of infection from another, is their first requisite. This second feature, of perfect isolation of its compound parts, thus avoiding cross infection, is a most important one. In small cities, of 30,000 population and under, it is a difficult proposition to have a perfect hospital and staff equal to all emergencies, and yet one whose upkeep is within the rational bounds of the present day laymen's conception. It is this feature of city ownership and management which makes the operation of an isolation hospital more difficult, because all health departments in Ontario depend primarily upon the board of health, a body of laymen, and finally upon the city council, for the acceptance of its estimates for current

expenses and the granting of sufficient funds to meet them. When the population of a city is from 20,000 to 30,000, an isolation hospital should have one bed for every 1,000 population. This capacity is only required in times of epidemic, but the upkeep is constant. It is difficult to impress boards of health and city councils with the advisability of such apparent over-investment and they will only agree to it upon being convinced of the feasibility of plans to keep down current expenses. I am of the opinion that the building I have had constructed in Fort William, and the plan of management, accomplishes all the above mentioned necessary features of municipal ownership.

The Fort William Isolation Hospital is planned, as the cuts show, with a basement, the floor of which is two feet above the level of the ground surface, and with the first and second hospital ward floors both reached by stairways and balconies built of iron and cement and exposed entirely to air and sunlight. Only the first hospital floor has as yet been constructed. Plumbing, heating, gas and electric conduits are already laid in the reinforced concrete ceiling of the first floor for the supply of the second floor.

The basement contains the steam heating apparatus for the entire building, and also includes the laundry and compressed air plant. The remainder of the basement is devoted to living quarters for the nurses when their side of the hospital is free of patients. When a nurse is attending a case she never leaves her ward day or night until the case is discharged from the hospital. She is effectively quarantined from any other part of the building for the length of time the case runs.

The two hospital ward floors are planned exactly alike. There are six wards on each floor and two diet kitchens; one large ward of six beds, one ward of two beds, a single-bed ward and a diet kitchen being on either side of a dividing wall running the length of the building. It is impossible to pass from one side of the building to the other without going out of doors. Each small ward has a separate entrance from outside, and the inside door communicating with other wards can be hermetically sealed, thus giving complete isolation.

The six wards are each provided with a bath and lavatory, and gas, electricity, and compressed air are delivered to the side of each bed for heating, lighting and atomizer use. Telephone connection with each ward is provided through the regular city telephone service. There are no electric light fixtures in the wards on the wall or ceiling. All such fixtures are portable and are placed on stands four feet high. The lamp stands have twelve inch flexible rods and are fitted with funnel-shaped

metal shades six inches in diameter and ten inches in depth. The rays of light are thus converged on the desired area without illuminating the remainder of the ward.

All plumbing and heating fixtures are of the latest hospital design, and while tiled in and thus dust proof are nevertheless very accessible for cleaning. All walls and ceilings are enamelled cement; floors are of polished and painted cement, with levels favoring drainage to central sewer traps, thus permitting wards to be flushed out with water. All angles and ledges are eliminated. The windows, doors, and casings are flush with the inside surface of the wall, and the doors have no panels. The windows are in three sections, a lower and upper fanlight, hinged at the lower edge, opening to the inside of the ward, with metal side sheets directing air currents to the ceiling and making direct air currents upon patients impossible. The center section of each window is laterally hinged, opening into the ward. There are no air conduits in the building, the windows providing the entire source of ventilation. Canvas blinds are placed on the outside of each window. The surface area of glass provided for the wards makes them practically sun-rooms.

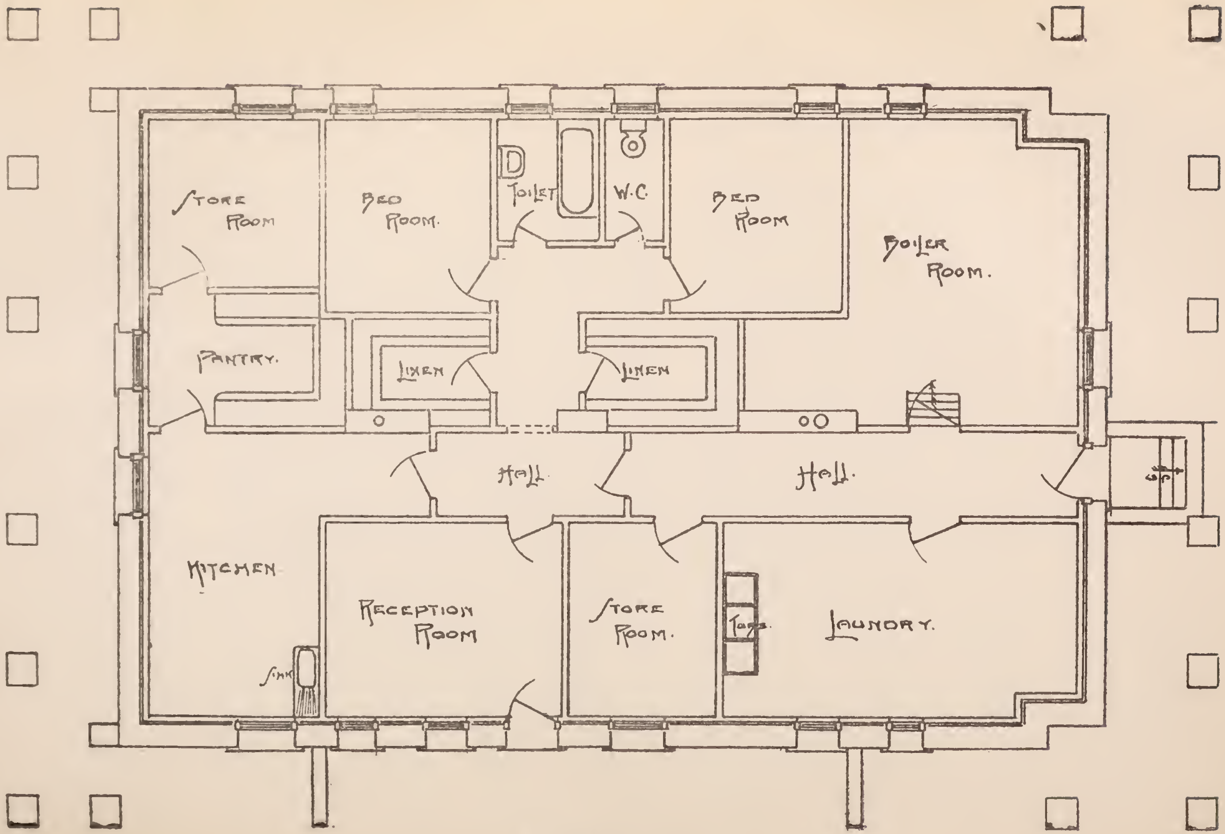
The outside walls are of solid brick; an air space of two inches intervening between the brick and the inside lining of hollow, four inch tile. Plaster, covered with cement, is surfaced over the tiling. Partitions are all made of tile, while ceilings are of reinforced concrete. The building is consequently practically fire-proof.

The diet kitchens are each provided with a sink, electric range, refrigerator, and a kitchen cabinet. Each is a complete working kitchen in which the nurse provides food for the patients and herself. An incinerator is provided at either end of the building, outside, so that each nurse can attend to the destruction of all refuse accumulating in her ward.

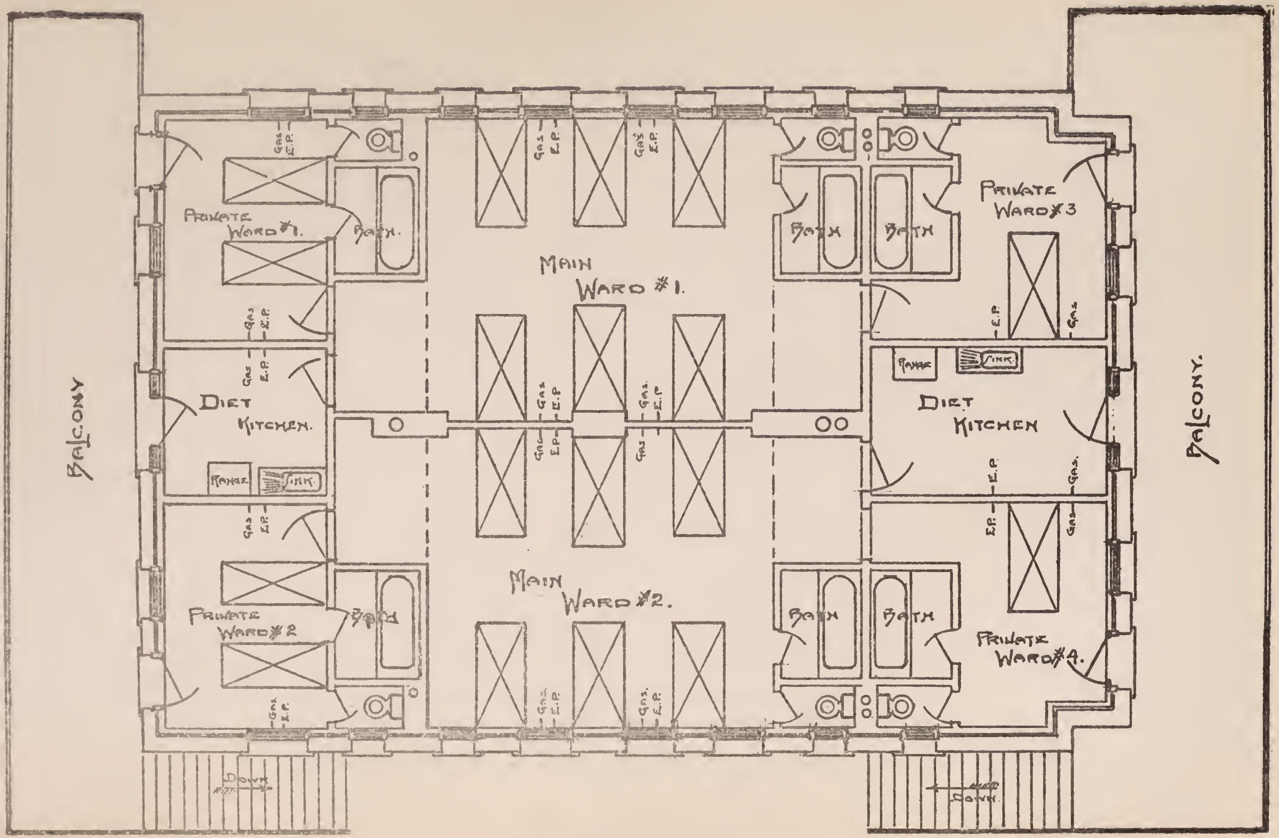
Each nurse has an independent unit hospital, requiring no assistance from without; she orders her own supplies which are delivered direct to her ward, which is numbered; she is thus interested in her ward expenses and can demonstrate by her good management her ability to cut down cost per capita per day.

The principal items of upkeep are: Interest and sinking fund on cost of construction, capital account being $18,000; salary per annum of first nurse $720.00; salary per annum of second nurse $600.00; salary per annum of fireman and caretaker $300.00; salary per annum of laundress $100.00.

The total number of hospital days last year was 600. This was a year extremely free from epidemics or even isolated cases of infectious diseases; this year will be much heavier. The second nurse is placed on



BASEMENT PLAN.



FIRST FLOOR PLAN.

duty only when two cases differing in infection are quarantined at the same time. Her services at other times are utilized as a school nurse, and for general health visiting, which thus more than repays the department for her salary. I find this service of the health department equal to all emergencies for a city of 25,000 population, even for the nursing of small-pox and the conducting of public vaccination stations.

The principal features which I find advantageous in our plant as arranged are:

(1). Ability to hold one able person responsible for the entire expenses accruing to the work in her charge. Owing to six beds usually being occupied by two sick patients and four convalescents, a single nurse with the assistance of the convalescents requires no extra help.

(2). Preparation of food in the ward by the nurses and the distribution of supplies direct to the ward obviate all possible necessity of freedom of movement of materials or people from one part of the building to another.

(3). Economy in food supplies from the use of separate kitchens; thus all returns from the table can be utilized to the highest advantage.

(4). Economy in the preparation of food because of the absence of maids or a high salaried cook, and by the use of electric stoves which are fire-proof, and not expensive to run—averaging at 4 cents a kilowatt, one cent a meal per capita.

(5). The small wards make excellent detention wards to which new patients are admitted for the first three days, awaiting developments of any cross infection, before entering the large ward.

(6). A six-bed ward is the largest I would favor owing to the reduced number of patients exposed in case of cross infection developing.

I am inclined to favor this method of management for isolation hospitals of any capacity.

American Public Health Association

OFFICIAL REPORT OF THE PROCEEDINGS OF THE THIRTY-EIGHTH MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, HELD AT MILWAUKEE, WISCONSIN, SEPTEMBER 6, 7, 8 AND 9, 1910.

TUESDAY, SEPTEMBER 6, 1910.

First Day—Morning session.

The Association met in the Auditorium at 8:30 a. m., and was called to order by the President, Dr Charles O. Probst, of Columbus, Ohio.

Dr. Gardner T. Swarts, of Providence, Rhode Island. Inasmuch as the minutes have been printed and are in the hands of the members of the Association I move that the reading of them be dispensed with.

Seconded and carried.

The Secretary. The following applicants for membership have been recommended by the Committee on Membership and by the Executive Committee for election:

ACTIVE MEMBERS.

William Allen, Charlotte, N. C.
E. Rosendo Amor, Mexico City, Mexico.
Robert A. Archibald, Oakland, Cal.
John Milton Armstrong, St. Paul, Minn.
Edgar Henry Summerfield Bailey, Lawrence, Kan.
Chas. B. Ball, Chicago, Ill.
Fernando Bauda, Guadalajara, Mexico.
Harry E. Barnard, Indianapolis, Ind.
Thomas H. Barnes, New Orleans, La.
Henry G. Beyer, Washington, D. C.
John T. Black, New London, Conn.
Pedro Delillo Borja, Chihuahua, Mexico.
Herbert R. Brown, Forest Hills, Boston.
Thomas A. Buckland, St. Louis, Mo.
Richard A. Burke, Ishpeming, Mich.
John E. Campbell, St. Paul, Minn.
Martinano Carvajal, Mazatlan, Mexico.
Katherine R. Collins, Atlanta, Ga.
J. Frank Corbett, Minneapolis, Minn.
Chas. Felix Crowley, Omaha, Neb.
Alvin Davison, Easton, Pa.
Thomas Dawson, Calgary, Alberta, Can.
James H. Dingle, Charleston, S. C.
Chester F. Drake, Aspinwall, Pa.
Lorne Drum, Ottawa, Can.
Harrison P. Eddy, Boston, Mass.
Almon L. Fales, Worcester, Mass.
Newell S. Ferry, Detroit, Mich.
Chas. N. Fiske, Washington, D. C.
Chester G. Gillespie, Berkeley, Cal.
James Grassick, Grand Forks, N. D.
Harry S. Grindley, Urbana, Ill.
Geo. K. Hagaman, Anoka, Minn.
Francis E. Harrington, Cumberland, Md.
Hastings H. Hart, New York City.
Thomas C. Hatton, Wilmington, Del.
Sylvester A. Hawes, Greenville, Ohio.
George H. Heald, Washington, D. C.
Henry B. Hemingway, Evanston, Ill.

Nicholas S. Hill, Jr., New York City.
Frank B. Hiller, Jefferson City, Mo.
William F. Hitchcock, Rochester, N. Y.
James J. Hogan, Ashtabula, O.
Chas. P. Hoover, Columbus, O.
Javiar Hoyo, Pachuca, Mexico.
John E. Hunter, Greenville, O.
Minnie Jenkins, Washington, D. C.
Fred C. Johnson, Mt. Alto, Pa.
Arthur L. Jones, Lima, O.
Lyman A. Jones, North Adams, Mass.
Wm. A. Jones, Minneapolis, Minn.
Lyman F. Kebler, Washington, D. C.
Stephen E. Kieffer, Berkeley, Cal.
Walter E. King, Detroit, Mich.
Gottfried Koehler, Chicago, Ill.
Waller S. Leathers, University, Miss.
Maurice Le Bosquet, Chicago, Ill.
Ernst J. Lederle, New York City.
Jacob G. Lipman, New Brunswick, N. J.
Paul A. Lewis, Philadelphia, Pa.
Harry Linenthal, Roxbury, Mass.
Robert C. Longfellow, Toledo, Ohio.
Wm. Cotton Lounsbury, Superior, Wis.
Chas. N. McBryde, Washington, D. C.
Milton E. McDonnell, Altoona, Pa.
Robert E. McDonnell, Kansas City, Mo.
Anthony McGill, Ottawa, Can.
Efien Maim, Mexico City, Mexico.
Thomas A. Mann, Durham, N. C.
John E. Meany, Manitowoc, Wis.
Alonzo D. Melvin, Washington, D. C.
David S. Merritt, Tarrytown, N. Y.
Harry M. Miley, Chambersburg, Pa.
Wm. W. Mills,
West New Brighton, Staten Isl.,N.Y.
Wm. P. Mott, Pittsburgh, Pa.
Anthony M. Murphy, La Crosse, Wis.
Arthur L. Murray, Washington, D. C.
Jas. W. Neave, Salisbury, N. C.
Henry A. Norden, Sturgeon Bay, Wis.
John O'Brien, Jr., Plainfield, N. J.
Michael M. O'Shaughnessy,
San Francisco, Cal.
Chas. B. Ogden, E. Liverpool, O.
Langdon Pearse, Chicago, Ill.
Henri Louis Petit, Chehalis, Wash.
Gustav A. Renz, St. Paul, Minn.
Francisco M. Rivera, Queretaro, Mex.
Wm. C. Rucker, Milwaukee, Wis.
H. F. Salmonde, Chicago, Ill.
Henry F. Sawtelle, Washington, D. C.
Wilbur Augustus Sawyer, Berkeley, Cal.
C. D. Scott, St. Louis, Mo.
Rafael Serrano, Puebla, Mexico.
Wm. H. Sharpley, Denver, Colo.
Jas. P. Simonds, Indianapolis, Ind.
Thomas H. A. Stites, Harrisburg, Pa.
Myron G. Spawn, Beloit, Wis.
Jas. L. Tighe, Holyoke, Mass.
Lawrence Veiller, New York City.
John A. Vogleson, Philadelphia, Pa.
Herschel N. Waite, Johnson, V.
Willis W. Waite, Syracuse, N. Y.
John LaBruce Ward, Columbia, S. C.
Hardolph Wasteneys, Berkeley, Cal.
Geo. C. Wellner, Red Wing, Minn.
Paul G. Weston, Philadelphia, Pa.
Chas. J. Whalen, Chicago, Ill.
Alex. McDowell Wilson, Philadelphia,Pa
Clarence P. Wilson, Washington, D. C.
John S. Wilson, Poughkeepsie, N. Y.
Robert E. Wodehouse, Ft. William, Ont.
Geo. B. Young, Chicago, Ill.

ASSOCIATE MEMBERS.

Bernhard Becker, Toledo, O.
Clyde E. Ford, Cleveland, O.
Edward S. Godfrey, Jr., Phoenix, Ariz.
Fred B. Grosbeck, Steubenville, O.
Henry Hanson, Jacksonville, Fla.
Montgomery E. Leary, Rochester, N. Y.
Harold W. Lyall, Brooklyn, N. Y.
Jos. Scott McNutt, Orange, N. J.
Edgar P. Mull, Toledo, O.
Everett E. Richardson, Webster City,Ia.
John W. Riley, Oklahoma City, Okla.
Clyde C. Slemons, Grand Rapids, Mich.
Chas. E. Terry, Jacksonville, Fla.
Henry E. Webster, Duluth, Minn.
William F. Wells, Boston, Mass.
Walter S. Wheeler, Kansas City, Mo.

THE PRESIDENT. What is your pleasure?

DR. SWARTS. I move that the Secretary be instructed to cast the vote of the Association for all of the names that have been read for election to membership.

Seconded and carried.

The Secretary cast the ballot for the applicants whose names had been read, and the President then declared them duly elected.

THE PRESIDENT. The Committee on Mailing of Infectious Material, of which Dr. John F. Anderson, of Washington, D. C., is Chairman, will now make its report.

REPORT OF THE COMMITTEE ON MAILING INFECTIOUS MATERIAL.

Your committee has to report that the proposed modifications of the regulations for the mailing of infectious material have finally been promulgated by the Postoffice Department under date of April 22, 1910.

The committee believes that its efforts have resulted in the promulgation of regulations which are a decided improvement over those formerly enforced. The regulations have been considerably simplified.

The committee was successful in having the privileges of the mails for the transmission of infectious material extended to include federal, state, municipal, and other laboratories upon the issuance of a formal permit by the Postmaster-General.

A copy of the new regulations is herewith appended.*

Your committee recommends that it be discharged.

Respectfully,

(Signed,) JOHN F. ANDERSON.

DR. SWARTS. I move that the report be received and the committee discharged.

Seconded and carried.

THE PRESIDENT. The next order is the report of the Committee on Engineering Membership, by Mr. Whipple.

MR. GEORGE C. WHIPPLE, of New York. Mr. President and Gentlemen: In the absence of the chairman of this committee I will simply say that the work of the committee has been directed toward securing as many members as possible among the sanitary engineers of the country, and of the long list of members elected this morning about twenty are engineers. The thought underlying the work of the committee has been the formation of a Section on Sanitary Engineering (or some similar title) of this Association, and we hope, possibly in another year, that you may hear from the engineering members that are present. We are preparing to

*July issue, page 491.

organize and ask your permission to form such a section. As the chairman is not here I am going to suggest that the work of the committee be continued another year.

THE PRESIDENT. You have heard the report of this committee and the recommendation that the committee be continued. What disposition will you make of it?

It was moved and seconded that the report be accepted and the committee continued. Carried.

THE PRESIDENT. As there is no further business to come before the Association at this time we will now proceed with the reading of papers.

A paper entitled Publication Problems of the American Public Health Association, by Mr. Burt R. Rickards, of Columbus, Ohio, was then read and discussed.

DISCUSSION.

DR. SWARTS. In view of the great importance of this paper and its relation to the success of the Association, I move that the paper be referred to the Executive Committee for consideration and some future action. which will be more definite than leaving the paper as it is.

DR. H. W. HILL, of Minneapolis, Minnesota. I should say not for some future action but for immediate action. I move to amend the motion to that effect.

DR. SWARTS. I accept the amendment.

The motion as amended was seconded and carried.

DR. G. S. RUEDIGER, of Grand Forks, North Dakota, read a paper entitled "Studies on Self-Purification of Streams."

The paper was dicussed by Drs. Hill, Bryce, and Levy, and the discussion was closed by Dr. Ruediger.

DR. JESUS E. MONJARAS, of Mexico City, read a paper entitled "Sanitary Registration of Houses in Mexico."

This paper was discussed by Dr. Torralbas.

DR. FRANCISCO M. RIVERA, of Queretaro, Mexico, read a paper entitled "The City of Queretaro as a Health Resort."

At this juncture the Association took a recess until 12:30 p. m.

The Association reconvened at 12:30 p. m., and was called to order by the President.

MR. CHARLES B. BALL, of Chicago, read a paper entitled "Sanitation of Bakeries and Kitchens."

The paper was discussed by Dr. Wellner.

MR. J. BOSLEY THOMAS, of Baltimore, Maryland, contributed a paper entitled "A Review of the Practical Methods of Supervising the Milk Supply of Cities," which was read by Dr. Stokes in the absence of the author.

Mr. Nathan Straus, of New York City, contributed a paper entitled "Saving of Children from Milk-Borne Diseases," which was read by the Secretary in the absence of the author.

On motion, the Association adjourned until 8 p. m.

First Day—Evening Session.

The Association reassembled at 8 p. m. and was called to order by the President. Prayer was offered by the Reverend Charles B. Moulinier.

Addresses of welcome were then delivered as follows: On behalf of the City of Milwaukee, by Hon. Emil Seidel, Mayor of the city; on behalf of the State of Wisconsin, by Hon. William J. Turner; on behalf of the medical profession, by Dr. W. A. Batchelor, and responses to these addresses of welcome were made on behalf of the United States by Dr. Richard Lewis, of Raleigh, North Carolina; on behalf of the Dominion of Canada by Dr. Frederick Montizambert, Director-General of Public Health, Ottawa, Canada; on behalf of the Republic of Mexico by Dr. Jesus E. Monjaras, of Mexico City, Mexico, and on behalf of the Republic of Cuba by Dr. Federico Torralbas, Havana, Cuba.

At this juncture the First Vice-President, Dr. Charles A. Hodgetts, of Toronto, Canada, took the Chair, and President Probst delivered his annual address.

At the conclusion of the President's address Dr. Batt moved that the address of the President be referred to the Executive Committee.

This motion was seconded by Dr. Bryce and carried, after which the Association adjourned until 9 a. m., Wednesday.

WEDNESDAY SEPTEMBER 7.

Second Day—Morning Session.

The Association met at 9 a. m. and was called to order by the President.

The Secretary. Applications for membership from the following named persons have been favorably acted upon by the Committee on Membership and the Executive Committee, and are now before the Association for action:

ACTIVE MEMBERS.

Julio F. Arteaga, Havana, Cuba.
James A. Beer, Columbus, O.
Wm. G. Carhart, Marion, Iowa.
John W. Clemmer, Columbus, O.
Albert De Bey, Orange City, Iowa.
C. St. Clair Drake, Chicago, Ill.
Livingston Farrand, New York City.
Newell K. Foster, Oakland, Cal.
John M. Glenn, New York City.
John A. Hutchinson, Montreal, P. Q.
Geo. W. McIntyre, St. Peter, Minn.
Fitch C. E. Mattison, Pasadena, Cal.
Frederick F. Russell, Washington, D. C.
O. H. Sellenings, Columbus, O.
Alphonse A. Thibaudeau, Buffalo, N. Y.
Frederick O. Tonney, Chicago, Ill.

ASSOCIATE MEMBERS.

John H. Landis, Cincinnati, O.
Geo. R. Randall, S. Milwaukee, Wis.
Hermann Welcker, Milwaukee, Wis.

On motion, the Secretary was instructed to cast the ballot for these applicants, which was done and the applicants named declared elected.

THE PRESIDENT. We will now take up the amendments to the Constitution and By-laws which were proposed at the last meeting. The Secretary will read them and then we will vote upon them.

The Secretary read: Amend Article V of the Constitution by inserting after section 7 a new section to be designated as 7a, as follows: That there be a Committee on Trust Funds appointed by the President, to consist of three members, to establish, augment, and see to the disbursement of trust funds for the purposes of the Association, and in accordance with the will of the donor.

DR. BRYCE. I move the adoption of the amendment.

DR. HURTY. I second the motion. Carried.

THE SECRETARY read: Amend the By-laws, Chapter 7, so as to provide: That an annual fee of five dollars shall entitle to membership in the Association and to membership in one section only, the member to designate at the time of application the particular section with which he desires to become identified, and annually thereafter at the time of the payment of the annual fees, that an additional fee of two dollars be charged for each additional section in which he desires membership.

THE PRESIDENT. You have heard the reading of this proposed amendment. What disposition will you make of it?

DR. FRANK W. WRIGHT, New Haven, Connecticut. I move that this proposed amendment be laid upon the table.

Seconded and carried.

THE SECRETARY read: Amend the By-laws, Chapter 1, so as to provide: The duration of the convention shall not exceed six days, and upon five of those only shall be held meetings for the presentation of papers.

DR. JOHN N. HURTY, of Indianapolis, Indiana. I move the adoption of the amendment as read.

Seconded and carried.

THE PRESIDENT. The next order will be the reading of the names of the Advisory Council that have been so far nominated and which body is to meet tomorrow to select the officers and place of meeting.

The Secretary then read the names of the Advisory Council as follows:

THE UNITED STATES.

The Federal Services.

Army, Medical Department, Col. Jefferson R. Kean.
Navy, Bureau of Medicine and Surgery, Dr. Chas. N. Fiske.
Public Health and Marine Hospital Service, Dr. John F. Anderson.
Bureau of the Census, Dr. Cressy L. Wilbur.
Bureau of Animal Industry, Dr. Marion Dorset.
Bureau of Chemistry, Dr. Geo. W. Stiles, Jr.

The States, Territories and Insular Possessions.

Alabama, Dr. Ellis M. Duncan.
California, Dr. William F. Snow.
Connecticut, Dr. H. W. Conn.
Georgia, Dr. John P. Kennedy.
Illinois, Prof. Edward Bartow.
Indiana, Dr. Severance Burrage.
Iowa, Dr. Henry Albert.
Kansas, Dr. E. H. S. Bailey.
Kentucky, Dr. William Bailey.
Maryland, Dr. Marshall L. Price.
Massachusetts, Mr. James O. Jordan.
Michigan, Dr. T. W. Shumway.
Minnesota, Dr. Hibbert W. Hill.
Missouri, Dr. H. Wheeler Bond.
Nebraska, Dr. E. Arthur Carr.
New Jersey, Dr. Harry M. Herbert.
New York, Dr. Charles F. Roberts.
North Carolina, Dr. Clarence A Shore.
North Dakota, Dr. Gustav F. Ruediger.
Ohio, Dr. Frank L. Watkins.
Oklahoma, Dr. John W. Riley.
Pennsylvania, Dr. Wilmer R. Batt.
Rhode Island, Dr. Charles V. Chapin.
South Carolina, Dr. Charles F. Williams.
Texas, Dr. William McD. Brumby.
Vermont, Dr. Henry D. Holton.
Virginia, Dr. Ernest C. Levy.
Wisconsin, Dr. Charles A Harper.
District of Columbia, Dr. Joseph J. Kinyoun.

THE DOMINION OF CANADA.

The Federal Services.

Public Health, Director-General, Dr. F. Montizambert.
Army Medical Service, Maj. Lorne Drum.
Immigration Service, Interior Department, Dr. Peter H. Bryce.
Commission on Conservation, Dr. Chas. A. Hodgetts.

The Provinces.

Alberta, Dr. F. H. Whitelaw.
Manitoba, Dr. Robert W. Simpson.
Saskatchewan, Dr. M. M. Seymour.
Ontario, Dr. Robert W. Bell.
Quebec, Dr. John A. Hutchinson.

THE REPUBLIC OF MEXICO.

THE FEDERAL SERVICES.

Superior Board of Health, J. E. Monjaras.

THE STATES.

Chihauhau, Dr. Pedro Delille Borja.
Mexico, Dr. Francisco Bernaldez.
Queretaro, Dr. F. M. Rivera.
District Federal, Dr. Fernando Lopez.

THE REPUBLIC OF CUBA.

THE FEDERAL SERVICES.

Director of Public Health, Juan Guiteras.

THE PROVINCES.

Pinar Del Rio, Federico Torralbas.
Havana, Julio F. Arteaga.
Mantanza, Gabriel Custadio.

THE ASSOCIATION SECTIONS.

Laboratory Section, Dr. W. R. Stokes.
Section on Vital Statistics, Dr. John S. Fulton.
Section of Municipal Health Officers, Dr. P. M. Hall.

A paper by Dr. Eduardo Liceaga, President of the Superior Board of Health, Mexico City, entitled Yellow Fever has Disappeared from the Mexican Republic, was read by the Secretary in the absence of the author.

At the conclusion of the reading of the paper the President said: Dr. Liceaga has faithfully reported to this Association every year since he became a member the exact condition in Mexico as regards yellow fever. I think a vote of congratulation for Mexico would be in order at this time.

DR. HURTY. I move that a vote of congratulation be extended to Dr. Liceaga for having freed that republic from yellow fever.

Seconded and carried.

The Association then held a symposium on "The Prevention of Mental Defects and Mental Diseases."

DR. WILLIAM A. WHITE, of Washington, D. C., read a paper entitled "Preventive Principles in the Field of Mental Medicine."

PROF. E. R. JOHNSTONE, of Vineland, New Jersey, contributed a paper on "Imbecility."

In the absence of the author the paper was read by title and referred to the Committee on Publication.

DR. C. H. HUGHES, of St. Louis, Missouri, followed with a paper entitled "Preventable Neuroses."

The symposium was discussed by Dr. H. B. Hemenway, of Evanston, Illinois, who introduced the following resolution with reference to accounts of suicides appearing in the daily papers and secular press:

WHEREAS, According to the mortuary statistics of the United States suicides have increased in frequency fifty per cent in seven years; and

WHEREAS, The American Academy of Medicine and the American Medical Association at their recent sessions in St. Louis called attention to the harmful effect of the publication of suicide accounts in the secular press:

Resolved, That the American Public Health Association hereby expresses the belief that the suggestive effect of accounts of suicides as published in the secular press is a powerful cause of suicides. We therefore request the newspapers to cease such publication, especially the details or methods chosen. We also recommend that statutes be enacted making such publication a misdemeanor and providing suitable penalty therefor.

The resolution of Dr. Hemenway was referred to the Executive Committee.

The symposium was further discussed by Drs. Hurty, Norden, Hughes and Rogers.

The Secretary read the report of the Committee on Necrology, as follows:

REPORT OF THE COMMITTEE ON NECROLOGY FOR THE YEAR 1910.

DR. CHARLES W. CRISPELL was born in 1860 in the City of Kingston, N. Y., and after he was graduated from the schools of that city was associated with the engineering corps of the West Shore Railroad. He gave courses in natural science in the Ulster Academy for a number of years. He attended Bellevue Hospital Medical College and the Medical Department of the University of Vermont and was graduated from the latter in 1883. He attended the first courses on bacteriology given by Dr. William H. Welch, then at Bellevue Hospital Medical College in New York. He practised medicine in the city of Kingston for ten years. During that time he was President of the Ulster County Medical Society. He had always been greatly interested in military surgery and medicine, and was at his death, captain and assistant surgeon of the 10th regiment N. G., New York.

In 1904 Dr. Crispell went to Europe and spent two years studying and doing special work in pathology, physiology and public health with Professors Stilling and Galli-Valerio at Lausanne, Switzerland; with Professors Knopf, Neumann, Roux and others at Heidelberg; with Professors Kocher, at Berne; Prof. Celli at Rome, and in other pathological and bacteriological laboratories in Berlin, Vienna and Munich. Returning to this country Dr. Crispell did special work in the clinical laboratory of the New York Hospital and particularly in the Research Laboratory of

the New York City Health Department. Early in 1907 Dr. Crispell became a voluntary assistant in the laboratory work and the educational campaign of the New York State Department of Health and became a large factor in the progressive work of that department. In this year he became a member of this Association. To the preparation of the New York State Travelling Tuberculosis Exhibition he devoted months of solid endeavor. These services had much to do with the great success of the New York State Anti-tuberculosis Campaign and the New York State Exhibition at the International Congress on Tuberculosis at Washington.

Although Dr. Crispell had been a member of this Association but a few years, he had become more than ordinarily popular by his kindly and democratic manner and his enthusiastic support of progressive work.

Ferdinand Charles Valentine, M. D., died at his home in Belle Harbor, Long Island, on December 13, 1909, of arterio-sclerosis and cardiac dilatation, thereby ending a busy and eventful career. He was born at sea on the 22nd of March, 1851, and his birth recorded at Leer, Germany. Shortly thereafter, his parents located in St. Louis, Mo., where he received his preliminary education and later was graduated from the McDowell Medical School in 1876.

Dr. Valentine's first inclination was toward diseases of the eye, and to this end he began his special studies with Professor Herman Knapp, of New York City, but abandoned this specialty and went to Honduras, Central America in 1878, where he acquired wide clinical experience and observation, ultimately becoming the Surgeon General of the Honduranian army. In 1886, he returned to New York and began general practice. After a few years, his increasing interest in genito-urinary diseases impelled him to limit his practice and studies to this branch of medicine and since 1894 or '95 he practiced with devotion this specialty.

Dr. Valentine's linguistic ability and facile pen enabled him not only to enrich the world of fiction, but also to present his scientific ideas distinctly and forcibly to the profession. In addition to numbers of scientific contributions to medical publications and medical discussions, he published a treatise entitled "The Irrigation Treatment of Gonorrhea, its Complications and Sequelae" which has obtained merited recognition in specialistic ranks. Urethroscopy, in particular, owes him a debt of gratitude for his technical simplification of the hitherto cumbersome instruments, thus popularizing this necessary diagnostic and therapeutic procedure.

He became a member of this Association in 1896, and was honored by membership in the Societe Francaise d'Urologie, Societe Belge d'Urologie, Deutsche Gesellschaft fur Urologie; the American Medical Association, American Society for Sanitary and Moral Prophylaxis, New York Academy of Medicine, German Medical, Harlem Medical, Eastern Medical Societies of New York City; the Association of Military Surgeons, Associated Physicians of Long Island, New York Society for Medical Jurisprudence, and the American Association for the Advancement of Science. He was also an ex-President of the American Urological Association, having been its third President. His hospital activities were limited to Emeritus Professor of Genito-Urinary Diseases in the New York School of Clinical Medicine, Consulting Genito-Urinary Surgeon to the West Side German Dispensary, the Manhattan State Hospital for the Insane, and the Red Cross Hospital.

Dr. Valentine possessed a unique character, veritably one *nascuntur, non fiunt.* His caustic sarcasm and occasional bluff manner covered many intensely human traits. He was generous to a fault, quick to forgive affronts, and ever unsuspicious of openly declared enemies.

He is survived by a widow, and an adult daughter by a former marriage.

Frank W. Reilly, M. D., Northwestern University Medical School. Chicago, 1861; Illinois Army Board, 1861; a member of the American Medical Association, American Public Health Association, 1874; Chicago Academy of Medicine; assistant Health Commissioner of Chicago; veteran of the Civil War; pioneer sanitarian and editor; died at his home in Chicago, December 16, 1909, from arterio-sclerosis and cerebral hemorrhage, aged 73. He was a native of England, and after studying in the Medical College of the State of South Carolina, Charleston, and Rush Medical College, Chicago, graduated from Chicago Medical College, and served that institution as demonstrator of anatomy. At the outbreak of the Civil War he enlisted as a volunteer surgeon and was seriously wounded at the battle of Shiloh; he later served as assistant surgeon of the Forty-fifth Illinois Volunteer Infantry and surgeon of the Twenty-sixth. From 1867 to 1873 he was sanitary inspector and assistant commissioner of the Chicago Health Department, and then entered the United States Public Health and Marine-Hospital Service. After the yellow fever epidemic in Memphis he was made sanitary inspector of the National Board of Health, and placed in charge of the sanitary regeneration of the city, and the Mississippi Valley. In 1881 he was made a member of the Illinois State Board of Health, and four years later became an editorial writer on the Chicago Morning News, and then was made managing editor. In 1891,

he was again appointed a member of the Illinois State Board of Health, and was made its secretary, and three years later he re-entered the Chicago Health Department and was made assistant commissioner of health in 1895. In 1873, while assistant commissioner of health, he served as editor of a monthly magazine called Hygiene, in which he inaugurated and urged a national campaign for health and hygiene. He was one of the committee of three who directed the educational campaign for a pure water supply, which established the feasibility of the drainage canal. He conceived and carried out the idea of publishing a weekly health bulletin, containing facts about the mortality and morbidity of Chicago, and setting forth the simpler lessons of public hygiene for the education of the public in the prevention of disease. While he was assistant secretary of the State Board of Health, the medical practice act of the state was put in force. Along the lines of sanitation and preventive medicine, Dr. Reilly's achievements were most noteworthy; and his sevices to public health have been of inestimable value to the city. state and nation.

Charles Benjamin Dudley, M. D., was born at Oxford, July 14, 1842, of New England parentage. His preliminary education was in the common schools and academy of the village. In 1862 he enlisted as a private in the 114th regiment of New York Volunteers. He participated in seven battles and was wounded in the battle of Opequan Creek. As a result of this wound, he was a cripple for life. He devoted his leisure time in camp to the study of Latin. At the close of the war he prepared for and entered Yale College, from which he was graduated with the degree of A. B. in 1871. Entering Sheffield Scientific School, he graduated in 1874 with the degree of Ph. D. The following year he was assistant to the professor of physics at the University of Pennsylvania. In November 1875, he accepted the position of chemist for the Pennsylvania Railroad Company, continuing to discharge the duties of this position until the time of his death. His appointment was the first of the kind and marked the beginning of a new era in the scientific study of the properties of metal and other materials used in railroad construction, as he was recognized as an expert authority upon them.

He was a member of the American Institute of Civil Engineers, American Society of Mining Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Electrochemical Society, Franklin Institute of Philadelphia, American Association for the Advancement of Science, American Philosophical Society of Philadelphia,

American Railway Association, American Historical Association, Society for Promotion of Engineering Education, American Forestry Association, American Chemical Society, and the American Public Health Association. He was also a member of the Iron and Steel Institute of Great Britain and numerous English, French and German Chemical Societies.

He became a member of this Association in 1888. He gave much time to the study of ventilation of railway coaches and devised the present improved methods now in use. In 1906 he married Miss Mary V. Crawford, of Bryn Mawr, Philadelphia, who survives him. He died December 31, 1909.

Samuel Peachy Latane, M. D., was born in Virginia in 1873, and was educated in the Baltimore City College and Johns Hopkins University. He was graduated from the University of Maryland in 1897, with the degree of M. D., and afterwards held the following positions: Member Medical and Chirurgical Faculty of Maryland, 1903; Senior Resident Physician, Lying-in-Hospital, University of Maryland; Resident Physician, Hospital for Women; also post graduate Johns Hopkins University; University Heidelberg, Germany; Member, Medical Staff, Winchester Memorial Hospital, and of the State Board of Health. He became a member of this Association in 1909. As a member of the Tuberculosis Committee he took a large part in the establishment of the Catawba Sanitorium. As a physician and investigator he took high rank. Able, well equipped and sympathetic, gracious, cultured and inspiring, he never failed to win friends. He was killed in an automobile accident near Winchester, Virginia, May 1, 1910.

Professor Franklin C. Robinson, was born April 24, 1852. He was graduated from Bowdoin College in 1873; in the same year he became assistant to the Professor of Chemistry in that institution. Upon the resignation of Prof. Carmichael he was elected Professor of Chemistry, which position he held at the time of his death, May 25, 1910.

He was a Fellow of the American Association for the Advancement of Science; member of the British Society of Chemical Industry; State Geologist; member of the State Board of Health; Vice-President of the American Chemical Society, and a member of many other societies. He became a member of the American Public Health Association in 1889, and its president in 1906.

While formaldehyde had been recognized as a most valuable disinfectant, it remained for Prof. Robinson to devise an apparatus which sent

the formaldehyde gas into a room through the key hole. This was exhibited at a meeting of the American Public Health Association at Buffalo in 1896.

His knowledge of chemical analysis caused him to be called into courts frequently to give expert testimony, not only in Maine, but throughout the eastern states.

Dr. Charles N. Hewitt, of Red Wing, Minn., died in Summit, N. J., on July 7, 1910, aged 72 years. Dr Hewitt was graduated from the Albany Medical College in 1857, and in 1861 enlisted in the Fiftieth New York Engineers as assistant surgeon, later becoming surgeon-in-chief of the engineer brigade. At the close of the war he was breveted a lieutenant-colonel, and removed to Minnesota where he practiced until his retirement a few years ago. In 1872 he became a member of this Association. The same year the Minnesota State Board of Health was organized and Dr. Hewitt was made executive secretary, an office which he held for twenty-five years. He was president of the American Public Health Association in 1888, and was an associate of the Society of Medical Officers of Health of England, and of the Societe d'Hygiene of France. For some twenty years he held a non-resident professorship of public health in the University of Minnesota. He was also a member of the American Medical Association and of the Minnesota State and Goodhue County Medical Societies.

Dr. William C. Chapman, of Toledo, Ohio, who has been a member of the American Public Health Association since 1890, died at his home in Toledo on May 29, 1910.

He was for many years a member of the American Medical Association; was for several years President of the Toledo Federation of Charities, and a member of the staff of St. Vincent's Hospital. His death was caused by nephritis. He was 69 years of age. He was appointed a member of the Ohio State Board of Health in 1899.

Dr. Darwin F. Palmer, of Geneva, Ohio, died August 26, 1910. Dr. Palmer had been a member of the Ohio State Board of Health since 1901, and a member of the American Public Health Association since 1907. He was also a member of the American Medical Association. His death occurred at the age of 68 years.

Dr. Gaston Puchot, of Matamoros, Tamaulipas, Mexico, an active member of the Association, elected in 1908, died early in 1910.

The President. You have heard the report of the Committee on Necrology. The Chair will entertain a motion for its adoption.

Dr. Hurty. I move its adoption.

Dr. Holton. Whenever a member of the Association dies, and knowledge of the fact comes to any member I wish he would get all the particulars or minutes of his life that would be desirable for an obituary and send it to the Committee on Necrology. It is difficult for us to get information. We receive the names of the members who die, but know nothing of their previous history.

The report was adopted unanimously by a rising vote.

Next in order was a symposium on "The Inter-Relation of National Organizations Working in the Interest of Health."

In the absence of Dr. C. Hampson Jones, of Baltimore, Maryland, Secretary of the Section on Preventive Medicine and Public Health of the American Medical Association, the Secretary, Dr. William C. Woodward, spoke for the American Medical Association.

He was followed by Dr. Livingston Farrand, who spoke for the National Association for the Study and Prevention of Tuberculosis.

Mr. Lawrence Veiller, Secretary of the National Housing Association, New York, spoke for that body.

Mr. Richard Watrous spoke for the American Civic Association.

Mr. Frederick Almy, Secretary, Buffalo, spoke for the National Conference of Charities.

Mr. Samuel E. Eliot, Secretary, New York, spoke for the Committee on the Prevention of Blindness, of the Russell Sage Foundation.

The National Child Labor Committee was represented by Mr. Edward M. Clopper, in the absence of the Secretary of this body, Mr. Lovejoy.

Dr. Marshall L. Price, of Baltimore, Maryland, spoke for the American Association for the Study and Prevention of Infant Mortality.

At the conclusion of his paper, Dr. Price presented the following preambles and resolutions, which were referred to the Executive Committee.

Whereas, The children of the nation are its most important asset, and

Whereas, The health of children is the basis of sound national health and is essential to national progress;

Whereas, There is an appalling and preventable waste of infant-life in this country; and

Whereas, There is a close relation between the conditions which make for or against public health, the infantile death rate, and the obligations of a nation to its potential citizens; and

Whereas, There is need of a more general appreciation of the possibility not merely of lowering the infantile death rate, but of conserving the health of these potential citizens; therefore, be it

Resolved, That the American Public Health Association welcomes the formation of the American Association for the Study and Prevention of Infant Mortality; endorses its platform of study and prevention; suggests to state and municipal health officers the appointment of local committees for the study of local conditions; and recommends coöperation with the American Association for the Study and Prevention of Infant Mortality in its national campaign of education; and, further

Resolved, That a committee be appointed from this Association to coöperate with the American Association for the Study and Prevention of Infant Mortality in furthering its general plans and more particularly in assisting the Association to present to the public in a forcible and effective way the best means of conserving the health of infants.

Dr. Herbert D. Pease, of New York City, then spoke for the American Public Health Association.

Dr. George M. Kober, of Washington, D. C., offered the following resolution, which was referred to the Executive Committee:

Whereas, The time is ripe for some form of coöperation between the national organizations working for the improvement of public health; therefore, be it

Resolved, That a committee be appointed by the Executive Committee, to invite an interchange of views with similar organizations and the appointment of them by similar committees in case they are of the same opinion;

Resolved, That the committee be instructed to report to the thirty-ninth annual meeting.

On motion, the Association adjourned until Thursday, 9 a. m.

Note:—Colonel Theodore Roosevelt was expected to address the members of the Association at the Auditorium between eleven and twelve o'clock, but his engagements were such that he could not do so. Being very anxious not to disappoint the Association he went to Whitefish Bay, whither the members had gone for luncheon, and addressed them there. He spoke as follows:

Mr. President and Members of the American Public Health Association:

"Like any other man in public affairs, I am awake to the needs of the public health. It is necessary to join our efforts for the preservation of the public health. It is important not only to keep the health of the individual, but also to keep the health of the nation.

"Yellow fever is a distinctive national problem. Several nationalities in the western hemisphere have dealt with it and must deal with it effectively to prevent the ravages of this scourge.

"The question of dealing with the public health is a matter of the last two generations. One-half a century ago nothing was known of the diseases which were a scourge to the human race. About six hundred years ago the black death desolated Europe, a disease which undoubtedly we could deal with now. Then it took off two-thirds of the population of Europe.

"I have just come from a trip to the middle of Africa, where disease ravages mankind as it did our ancestors. I passed through regions where the sleeping sickness has to its credit over 200,000 deaths in one neighborhood.

"The advances made during the last half century are incalculable. The work on the Isthmus of Panama could not have been done in its present shape a decade ago. They could not have grappled with disease as now.

"The prime requisite in every nation is to have every man and woman an effective unit. You are dealing with basic problems of citizenship. Men cannot be good unless they are healthy.

"I welcome the delegates to this convention who came from foreign countries, especially from the Americas. In the two Americas we are solving the problem of living peacefully together. Our only rivalry—far different from Europe—is the endeavor to see which is best able to cope with the problems that confront us all. I welcome you as our rivals, who are doing all in your power to uplift and care for the physical well-being of the human race."

THURSDAY, SEPTEMBER 8, 1910.

Third Day—Morning Session.

The Association met at 9 a. m., and was called to order by the President.

The Secretary. Applications for membership have been filed by the applicants whose names I will read, and have been favorably acted upon by the Committee on Membership and by the Executive Committee. They are now before the Association for action.

ACTIVE MEMBERSHIP.

E. Arthur Carr, Lincoln, Neb.
H. B. Cummins, Seward, Neb.
Charles A. Faber, Milwaukee, Wis.
Francis E. Fronczak, Buffalo, N. Y.
Frank W. Shumway, Lansing, Mich.
John Wilson, Mankato, Minn.
Charles S. Woods, Indianapolis, Ind.

ASSOCIATE MEMBERSHIP.

Harry W. Long, Escanaba, Mich.
Charles Gilbert Gery, Marietta, Pa.
Edward T. Biwer, Chicago, Ill.

On motion the Secretary was authorized to cast the ballot of the Association for these applicants, and this having been done they were declared duly elected.

Announcements were made by the Chairman of the Local Committee of Arrangements, Dr. Bading.

THE PRESIDENT. Is there any report from the Executive Committee?

THE SECRETARY. The Executive Committee has authorized placing on the program a paper entitled "The Tax and Struggle Against Alcoholism," by Dr. Rafael Serrano, of Mexico.

THE SECRETARY. The Executive Committee recommends that the general meeting of the Association be called at three o'clock this afternoon. It was found that the Association was pressed for time and there was but one section meeting that afternoon, and therefore it was deemed advisable to call a meeting of the general Association at three o'clock to proceed with the regular program.

DR. HODGETTS moved that the recommendation of the Executive Committee be concurred in. Seconded and carried.

THE SECRETARY. There has been some misunderstanding arising out of the distinction between active and associate membership. The matter was referred to a sub-committee of the Executive Committee, which recommended, in order that there might be no unjust discrimination, that the Constitution be amended, Article III, Section 6, by adding: "And to such others as the Executive Committee may recommend as presenting satisfactory qualifications in lieu of the three years' service specified above." Under the Constitution this lies over until next year.

THE SECRETARY. On the recommendation of Mr. Rickards, the Executive Committee has presented for consideration the following proposed amendment to the By-laws: After the last word in Chapter ten, insert the words: "The Committee of Seven shall have the power to make such changes and such changes only in the By-laws of the Association as may be required to adapt them to the rules and regulations of the United States postal authorities. Such changes as the Committee of Seven shall make shall be presented to the Association, at its next regular meeting, for ratification."

The Executive Committee recommends the adoption of this amendment to the By-laws. Under the By-laws it must lie over until tomorrow.

THE SECRETARY. With reference to the resolution presented by Dr. Kober yesterday, and which was referred to the Executive Committee, the Executive Committee reports that a recommendation of similar purport was embodied in the President's annual address and had been acted favorably upon by the Executive Committee, the report to be

submitted at the proper time tomorrow, and without any prejudice to the resolution of Dr. Kober, the Executive Committee recommends that it be laid on the table.

Dr. Kober thereupon, with the consent of the Association, withdrew his resolution.

THE SECRETARY. As to the resolution offered by Dr. Hemenway, after due consideration the Executive Committee instructed me to report that in its judgment the adoption of the resolution at the present time was not expedient.

THE PRESIDENT. You have heard the resolution and the recommendation of the Executive Committee. What will you do with it?

DR. KOBER. I move the recommendation of the Executive Committee be approved. (Seconded and carried.)

THE SECRETARY. A resolution was offered by Dr. Marshall L. Price yesterday relative to the coöperation of this Association with like organizations working along similar lines, notably with the American Association for the Study of Prevention of Infant Mortality. The subject matter of Dr. Price's resolution was covered by a part of the President's annual address and had been acted upon prior to the submission of this resolution to the Executive Committee. Dr. Price, on becoming acquainted with that fact, requested that the committee recommend that he be given permission to withdraw his resolution. The Executive Committee therefore recommends that Dr. Price be permitted to withdraw the resolution offered by him.

THE PRESIDENT. Is there any objection to the withdrawal of this resolution? If not, it will be so ordered. (It was so ordered.)

THE PRESIDENT. The next business will be the report of the Treasurer, Dr. Frank W. Wright.

DR. WRIGHT presented his report as follows:

FRANK W. WRIGHT, TREASURER, IN ACCOUNT WITH THE AMERICAN PUBLIC HEALTH ASSOCIATION.

1909. DR.	
Oct. 13, Cash on hand in General Fund	$ 979.24
Cash received from dues, 1907	10.00
Cash received from dues, 1908	75.00
Cash received from dues, 1909	2,370.00
Cash received from dues, 1910	185.00
Sale of Transactions	401.20
Sale of desk	15.00
Eastman donation	500.00
In Savings Banks	2,122.40
	$ 6,657.84

1909	Cr.	Order No.	
Oct. 27,	American Journal of Public Hygiene	315	$ 351.50
	Remington Zeigler Co	316	250.24
	F. J. Heer Printing Co	318	183.40
	W. R. Stokes	319	3.20
	C. O. Probst	320	400.00
	F. W. Wright	321	200.00
Nov. 22,	Mrs. M. L. Riley	322	16.70
	B. R. Rickards	323	4.34
	E. C. Levy	324	28.30
	T. L. Bigelow & Sons Co.	325	3.64
	C. O. Probst	326	64.03
	American Express Co	327	2.91
	United States Express Co	328	1.01
	Wells Fargo Express Co	329	2.89
Dec. 6,	T. R. Shearer	330	184.30
1910.			
Jan. 3,	Ora Evans	332	2.80
18,	Wellington Paret & Co.	331	34.50
Feb. 2,	F. J. Heer Printing Co	333	20.00
8,	Tuttle, Morehoass & Taylor	334	3.60
15,	Judd & Detwiler	335	61.45
Mch. 15,	John A. Hauff	336	15.00
	American Journal of Public Hygiene	337	64.60
Apr. 12,	B. R. Rickards	338	5 00
	Judd & Detwiler	339	48.00
May 2,	C. G. Stott & Co	340	23.30
25,	F. C. McElroy & Co	341	13.50
June 10,	American Journal of Public Hygiene	342	365.30
	Spahr & Glenn	343	2.75
22,	Adams Express Co	344	3.62
	United States Express Co	345	.39
	American Express Co	346	3.42
	C. G. Stott & Co	347	2.75
July 13,	American Express Co	348	1.11
26,	F. W. Wright	349	230.00
29,	Underwood Typewriter Co	350	3.20
Aug. 1,	Lamb & Tilden	351	3.55
3,	American Journal of Public Hygiene	352	352.50
9,	Judd & Detwiler	353	38 50
	C. G. Stott & Co	354	.85
	Crane Printing Co	355	45.75
14,	B. R. Rickards	356	2.00
	Total Expenditures		$3,043.90
Cash in General Fund			991.54
Cash in Savings Banks			2,622.40
			$6,657.84

September 5, 1910.

The Committee of Seven has examined the account books, vouchers, and assets of the Treasurer, and found them correct, balance on hand being $3,613.94.

C. O. Probst, Chairman, W. C. Woodward, Secretary.

THE PRESIDENT. You have heard the report of the Treasurer. This report has been audited by the Committee of Seven, who has examined the books and vouchers of the Treasurer and has found them correct. with a balance on hand of $3,613.94. The report is signed by Dr. C. O. Probst, Chairman, and Dr. William C. Woodward, Secretary.

The question is on the adoption of the Treasurer's report.

DR. HOLTON. I move that the report of the Treasurer be adopted. (Seconded and carried.)

THE PRESIDENT. I will now call for reports from the Committee on Publication, the Committee on Publicity, and the Committee on Incorporation. These matters are in the hands of the Secretary.

THE SECRETARY. These committees have more or less diverse duties. The reports I am instructed to make are as follows: So far as the work of the Committee on Publication is concerned, arrangements were made with the American Journal of Public Hygiene to publish its proceedings in that Journal. The proceedings have been so published, and members who desire to obtain separate bound copies to complete their set should make application to the Secretary for that purpose, remitting five dollars.

The Committee on Publicity was appointed as the result of a recommendation in the President's annual address for the adoption of some method whereby the work of the Association might be more definitely brought before the public, the idea being that the Committee on Publication should feed the newspaper press of the country with pertinent items concerning the work of the Association. After the appointment of that Committee some question arose with respect to the work of the Committee on Publicity and the Membership Committee, as to whether the work of the Publicity Committee, as indicated by its name, did not include work for increased membership. After conference with the President of the Association and the Chairman of the Committee on Membership, the Committee on Publicity undertook the work of bringing the work of the American Public Health Association to the attention of prospective members. The results of the year's work are apparent here today.

With respect to the work of the Committee on Incorporation, some question arose as to the best method of proceeding to incorporate. The Association may incorporate in many states under state laws, in which case probably a majority of the members would have to be residents of the state in which incorporation was taken out, and in most, if not all, of the states the members would have to be citizens of the United States. That would mean, of course, elimination from the original incorporation, of our Canadian, Mexican and Cuban members. The state legislatures generally, or the United States Congress, might pass an Act of incorporation includ-

ing the foreign members. There was a feeling in some quarters that the best thing for the Association to do was to seek a special Act of incorporation from the Congress of the United States, which, by virtue of its position as local legislature for the District of Columbia, has the right to incorporate associations. Certain prominent members of the Canadian, Mexican and Cuban delegations were consulted and they stated personally that there would be no objection on their part, and they believed there would be no feeling if the incorporators of this Association were necessarily selected altogether from among the citizens of the United States. That, however, is as far as the work has gone. The committee would recommend that either the Association or the Executive Committee advise the Committee on Incorporation, if it is desired to continue it, as to what members of the Association should be named as incorporators, so that the Committee on Incorporation may proceed to obtain such a charter for the Association as may be feasible, and include among the incorporators named in such charter as many members as directed by the Association or by the Executive Committee as may be possible. I believe that if it is the desire of the Association that the Committee on Incorporation actually proceed to obtain a charter that fact ought to be clearly and definitely expressed in the record. I believe that any committee that may be appointed, judging from the feeling of the members of the committee which is about to terminate its existence, will want it clearly and specifically stated what course it is to pursue before abandoning our present form of existence and changing to one that is entirely different.

Dr. Hurty. What are the advantages of incorporation? It seems to me we have grown without it.

The Secretary. With respect to that I am speaking the views that come to me from other members of the Association. My own views are a matter of no interest to the Association. The argument is briefly this: If the Association were incorporated it would be easier to obtain trust funds. In other words, we are a loose-jointed organization at the present time, subject, you may say, to almost no legislative restriction, at liberty to change the responsibility of the Association at any moment. For instance, we could convert the Association into one for the disposal of dead animals or into a society for the maintenance of a propaganda against vaccination. We can do just exactly what we please by a two-thirds vote of the Association. Naturally, under those circumstances, it is believed that numerous gentlemen around the country who have millions of dollars in their pockets and hundreds of thousands to dispose of will hesitate before they give them; whereas, if these gentlemen of generous impulses can be shown an act of incorporation which is limited in its scope by law and which can only

be altered as the law may provide, it is believed that we would better obtain from these sources, either by gift or by bequest, money that would enable the Association to carry on more active work than is now possible. Briefly, these are the arguments that are made in favor of incorporation. As against that argument, I have never heard any good reason advanced.

THE PRESIDENT. I think it would be competent for the Association at this time to determine whether they wish articles of incorporation. The Chair will entertain a motion to that effect.

DR. HOLTON. I move that this committee be continued and be authorized and requested to secure articles of incorporation from the Congress of the United States.

This motion was seconded by several.

DR. JAMES R. KEAN, of Washington, D. C. I move to amend that the members of the Advisory Council be named as incorporators.

THE PRESIDENT. Do you wish to accept that amendment? That would include other countries, such as Mexico, Cuba and Canada.

THE SECRETARY. It occurs to me that there ought to be a broader latitude allowed to the committee. If the committee is definitely instructed to obtain from the Congress of the United States articles of incorporation the committee may have a very strenuous time next winter. Another point is with respect to the incorporators. While it is true that the Advisory Council is an important body, yet it is an evanescent body, existing so to speak only for a few days and then vanishing into the thin air until the Association next meets. The Executive Committee appears to me to be a stronger body, being composed to a great extent of the ex-Presidents of the Association—men who have been with us for many years and who know the work of the Association and are closely identified with it. I believe, moreover, any resolution designating any particular group of members as incorporators, should empower the Committee on Incorporation to add other members, if deemed expedient. I make no motion. I merely throw out the hint in the course of this discussion, so that it may be considered by the gentlemen who have made motions and by others, with a view to formulating their views.

DR. HOLTON. I understood from the report that was made that that was the way to get Congress to incorporate the Association.

THE SECRETARY. And that is most desirable.

DR. HOLTON. I would modify my motion to this effect, that the committee be continued and instructed to secure articles of incorporation, preferably by Congress, and leaving it to the judgment of the members of the committee how it shall be done. (Seconded.)

Dr. Kean. I accept the Executive Committee instead of the Advisory Council. I admit the list composing the Advisory Council is rather too small because it would only mean perhaps twenty or thirty members. In the organization of the American Medical Association the list is much longer. I wish to amend my motion by including the Executive Committee instead of the Advisory Council. (Seconded.)

Dr. Holton. I accept the amendment.

Dr. Hills Cole. It might be that if the Association seeks incorporation by state law, the state might require that a certain number of incorporators be residents of that state and the committee might want a little latitude in that respect.

The Secretary. I move to further amend that the committee be authorized to add to the list of incorporators such local members of the Association as may be necessary to procure possible compliance with the local laws.

Seconded.

The original motion as amended was put and carried.

The President. We will now have a report from the Committee on Exhibit. Dr. William A. Evans, of Chicago, is Chairman of that committee.

Dr. Evans. As to the Committee on Exhibit, the idea of the exhibit originated in the latter part of July of this year. The President at that time appointed a Committee on Exhibit, consisting of Dr. Bond, Dr. Rucker, and myself. It was recognized in the limited amount of time at our disposal it would not be possible to get an exhibit that would be truly illustrative of health department work throughout this country and all phases of health department work. In consequence of that fact it was decided that the exhibit should be scientific and that there should not be a commercial exhibit. Then, in consequence of the short time and the lack of opportunity for consultation as to detail, it was decided furthermore that the scientific exhibit should be limited, in so far as it could be limited, to those articles in actual use in departments of health. The request was made for things that were being used and for methods that were in operation in the various departments of health throughout the country, and the exhibit that has been gathered here for us is one that has been prepared especially for the purpose of this exhibition, but it represents the tools in daily use in the various departments of health throughout the country. It was thought in view of the limited time at our disposal for publication that it was perhaps best to invite a relatively small number of bodies to exhibit, and in consequence invitations were sent to the national government, to several branches of the national government, to a few of the larger cities on the Atlantic seaboard and to a number of states, relative

to the Milwaukee meeting. Of these the following accepted the invitation and have furnished exhibits that are in position: The National Dental Association; the American Public Health Association; the United States Public Health and Marine-Hospital Service; the Bureau of Chemistry, Department of Agriculture; the New York, Philadelphia, Detroit, Indianapolis, Columbus, Rochester, Denver, St. Louis, and Chicago Health Departments; the University of Minnesota; the State Board of Health of California (although the exhibit of the State Board of Health of California has been lost in transit, or has not yet arrived). Under the head of Chicago are included contributions to the exhibit from the Sanitary District, from the Tuberculosis Institute, and from the Infant Welfare Commission and Milk Commission. The character of the exhibit is, of course, a matter of which you can judge. The exhibit was promptly installed without expense to the Association and practically without expense to the local committee. I believe Dr. Rucker, who is responsible for the installation, stated that the expense of installation has been eighty cents, expended from the funds of the local committee. The thanks of the Association are especially due to Dr. Rucker for his effort in getting the exhibit in position. To my mind it means this: It has been possible in the space of two months to gather together an exhibit like this, which indicates in the first place that health departments are active in their administrative and educational work. It indicates furthermore that there is a demand for the particular exhibit of methods and appliances; again, that there is a demand on the part of the membership of the Association for an opportunity to see the appliances and methods that are in use in the various departments of health throughout this country. I believe with more time an exhibit could be gathered together that would be truly representative of the health departments everywhere throughout this land. I believe it should be made a permanent and prominent part of the meetings of the American Public Health Association and that probably there should be combined with it or carried along with it a commercial exhibit. This committee therefore would recommend to the Association that the exhibit be made a permanent feature of the meetings of the American Public Health Association.

The President. You have heard this report. I wish to state in the beginning that great credit for the idea of this exhibit belongs to Dr. Evans. At his request the President arranged for the appointment of a committee. I know the many difficulties that the committee has encountered in installing this exhibit, and I hope, therefore, that some member will move a vote of thanks to Dr. Evans and his committee for providing this exhibit.

Dr. Swarts. If it is proper at this time to make that motion, I should like to do so.

The President. Proceed.

Dr. Swarts. I can fully appreciate the efforts that have been made and shown in the presentation of this vast amount of material which has come from Chicago and elsewhere. No one can realize, unless he has undertaken the work of gathering together such a vast amount of material, the work that it requires to do so. This exhibit is a great object lesson and it goes further toward teaching us what we want to know, more than all of the papers, and the graphic methods of illustration have brought to the attention of the members of the Association many things which have not been introduced before. For instance, attention has been directed to dental hygiene, a thing which is coming to the front at present. We have been absorbed in communicable diseases such as scarlet fever, diphtheria and other affections, and if this exhibit can be continued and made a part of each meeting it would be the means of giving us information which we could not get in any other way. I move that a vote of thanks be extended to Dr. Evans and his committee for the excellent work they have done in installing this exhibit.

The motion was seconded by several and carried.

The President. There was a recommendation in the report of this Committee that a vote of thanks be extended to Dr. Rucker, of this city, who did the actual work in installing such an exhibit.

Dr. Samuel H. Durgin, of Boston. I move that a vote of thanks be extended to Dr. Rucker, Health Commissioner of the City of Milwaukee, for installing this exhibit.

Seconded and carried.

The President. The further recommendation was made by the Committee that the Association should continue or commit itself to the plan of having at each of our annual meetings some exhibit, and if I understand the recommendation, enlarging this exhibit so as to include any commercial sanitary exhibits. Do you wish to act on that now?

Dr. Swarts. I move that this be referred to the Executive Committee for consideration and report back to this Association before adjournment.

Seconded and carried.

The Secretary. While votes of thanks are in order there is one item that appeared, I believe, in the report of the Treasurer, which has escaped the attention of members of the Association. During the past year Mr. George Eastman, of Rochester, New York, donated to the American Public Health Association through Dr. George W. Goler, five hundred dollars, for the purposes of the Association. It would appear

that some recognition should be taken of such a gift and accordingly the Executive Committee has recommended that the Secretary transmit to Mr. Eastman a vote of thanks for this donation.

THE PRESIDENT. The Chair will be glad to entertain a motion that a vote of thanks be extended to Mr. Eastman.

DR. BRYCE. I desire to move that suitable recognition of this gift be given to Mr. Eastman through Dr. Goler.

(Seconded and carried.)

THE SECRETARY. I suspect that a vote of thanks extended to Dr. Goler would not be entirely out of order.

DR. DURGIN. I move that such a vote of thanks be extended to Dr. Goler.

(Seconded and carried.)

DR. BRYCE. I move that the report of Dr. Hill be allowed to come in as a part of this morning's business.

(Seconded and carried.)

The President suggested that the name of Mr. Eastman be referred to the Advisory Council for Honorary Membership.

THE SECRETARY. The Executive Committee recommends that the American Public Health Association endorse the principles embodied in the Owen Bill for the establishment of a national department of public health.

DR. EVANS. I move that the recommendation of the Executive Committee be concurred in.

(Seconded and carried.)

DR. OWEN. Perhaps it would be interesting to the members of the Association to know what the feeling is of those who have testified before the Committees of Congress with reference to this matter:

"MR. ROBERT LYNN COX, said: I am here to speak in favor of this bill in behalf of the life insurance business as represented by the leading life insurance companies of the United States. I hope my appearance will serve to emphasize the economic aspect of prolonging human life." (Senate hearing No. 1, page 19.)

"DR. WILLIAM H. WELCH, said: The question on the manner and extent of the activity of the Federal Government in the promotion of public health is one of prime national importance and it is most gratifying to hear from the Chairman of this committee that its importance is generally appreciated by members of Congress."

"The Surgeon-General of the U. S. Army, Brigadier-General William Torney, said: I have already expressed myself on other occasions as to the nature of this bill and as to the advisability of its enactment. I believe sometime ago there was some statement made that the War Department, or I believe the Medical Department of the War Department, was opposed to its enactment. I want to state positively that it is not so. We are entirely in accord with the purposes of the bill and hope that it will pass Congress." (Senate hearing No. 1, page 88.)

"Dr. Charles F. Stokes, Surgeon-General United States Navy, said: I have been asked to come here and express my opinion as to the advisability of the establishment of a department of public health, with a secretary a member of the Cabinet. I am strongly in favor of the establishment of such a department under those conditions, on the score of efficiency, economy and common humanity." (House hearings, Part 2, page 128.)

"Surgeon-General Wyman, Public Health and Marine Hospital Service of the United States, says: I have always had in mind that ultimately we should have a department of public health, with a secretary in the Cabinet, and I have always had that desire in mind and have never opposed a department of health. I wish to say that I am in favor of it. (Page 150.)

"I only want to say that I, personally, and as Surgeon-General of the Public Health and Marine Hospital Service, and I speak also for the corps, do not wish to be considered in any way opposed to any measure that will benefit humanity or will benefit the well-being or health of this country and if you see fit in your wisdom to establish a department of health, with a secretary in the Cabinet, we would receive it with pleasure." Senate hearing, No. 2, page 151.)

I feel that I can say that Dr. H. W. Wiley is also in favor of this measure and it gives me great pleasure to feel that the United States Public Health and Marine Hospital Service officers are in favor of this organization, as voiced in the testimony of General Wyman. We, one and all, know that with his hundred and more commissioned officers, and his two or three hundred active assistant surgeons, scattered as they are throughout the entire United States and the islands, this force is very strong.

The Secretary. The Association has been requested by the Secretary-General of the International Congress on Hygiene and Demography to nominate a member to the State Department for appointment on the committee having this matter in charge. The Executive Committee recommends that the Association nominate to the State Department, for that purpose, Dr. Charles O. Probst, the present President of this Association.

The Secretary. As many as are in favor of that motion will please say, aye; contrary- minded, no.

(Carried unanimously.)

Dr. Bryce. I move that Dr. Hill now present his report of the Committee on Typhoid.

(Seconded and carried.)

Dr. H. W. Hill, of Minneapolis, Minnesota, then presented his report, as follows:

REPORT OF COMMITTEE ON REPORTING TYPHOID FEVER.

The Committee on reporting Typhoid Fever submits the following as its work for 1909-10.

In accordance with the recommendations and authorization under which this Committee was last year continued, a resolution was drawn for presentation to the American Medical Association, through its Section on Public Health and Preventive Medicine, and this resolution (a copy of which is submitted herewith) was presented by the Chairman of your Committee, at the regular meeting of the said Section, held at St. Louis, Mo., June 7-10, 1910, endorsed unanimously by motion and vote and ordered transmitted to the House of Delegates.

This resolution never reached the House of Delegates and the minutes of the Section show no records of the resolution or the vote of endorsation or other remarks.

The Committee asks to be continued in order to attempt further the task of bringing this resolution before the House of Delegates.

(Signed) CHARLES V. CHAPIN,
JOHN F. ANDERSON,
E. C. LEVY,
H. W. HILL, *Chairman.*

DR. HILL. I would ask that the committee be continued so that next time the matter can be brought before the House of Delegates of the American Medical Association.

THE PRESIDENT. You have heard this report. What disposition will you make of it?

It was moved and seconded that the report of the committee be accepted and the committee continued. Carried.

THE PRESIDENT. We will now listen to a symposium on the "Prevention of Gonorrhea and Syphilis."

DR. GEORGE M. KOBER, Chairman, Washington, D. C., read the report of the committee on "Education of the Public as to the Communicability and Prevention of Gonorrhea and Syphilis."

Under date of September 15, 1910, and hence subsequent to the presentation of the above report, Dr. George H. Simmons, General Secretary of the American Medical Association, in a letter to Dr. Marshall Langton Price, corrects his statement of July 26, 1910, and states that the resolution here mentioned is recorded in the minutes of the Section on Preventive Medicine and Public Health and was adopted by the Section. He states, however, that the matter there rested and the resolutions were not forwarded to the House of Delegates, as they should have been, in accordance with the order of the Section.

We are glad to make this correction since at the time of the presentation of the report at the Milwaukee meeting of the American Public Health Association, the only statement from Dr. Simmons was to the effect that the minutes showed no record of the presentation or endorsation of the resolutions.

Dr. Charles N. Fiske, Surgeon U. S. Navy, Washington, D. C., read a paper entitled "A Consideration of Venereal Prophylaxis in the United States Navy for the Benefit of Public Health Officers."

Dr. J. W. Kerr, Public Health and Marine Hospital Service, Washington, D. C., read a paper entitled "Venereal Diseases among Seamen in the Merchant Marine."

Colonel J. R. Kean, Medical Corps, U. S. A., Washington, D. C., read a paper entitled "A Plea for Applying the Usual Methods of Preventive Medicine to Venereal Diseases."

The symposium was discussed br Drs. Swarts, Neff, Richardson, Hurty, Kober, Fiske, Kerr, and the discussion was closed by Colonel Kean.

Dr. Evans. I move that the committee on the Education of the Public as to the Communicability and Prevention of Gonorrhea and Syphilis be continued.

(Seconded and carried.)

Dr. Hurty. I wish to offer the following resolution:

Resolved, That the American Public Health Association offers and records its hearty approval and commendation of the educational work carried on by the *Ladies Home Journal* regarding the necessity and ways of teaching children the truth about reproduction and the sexual life.

Referred to the Executive Committee.

The President announced that the papers on the program that were not disposed of yesterday would be taken up in the afternoon at three o'clock.

The Chairman of the Local Committee of Arrangements announced a smoker at the Palm Garden.

The next in order was a symposium on "Methods of Handling State Work."

Papers were read as follows:

"Organization," by Dr. Samuel G. Dixon, of Harrisburg, Pa.

"Research," by Mr. H. W. Clark, of Boston, Mass.

"Executive Methods in Preventive Medicine," by Dr. H. B. Hemenway of Evanston, Illinois.

"The Relation Between State and Municipal Boards of Health," by Dr. C. A. Harper, of Madison, Wisconsin.

The symposium was discussed by Drs. Snow, and Hemenway, after which on motion, the Association adjourned until three p. m.

Third Day—Afternoon Session.

The Association reassembled at 3 p. m. and was called to order by the President.

Mr. Richard Watrous, of Washington, D. C., made some remarks on "The Conduct of a Fly Campaign," which were illustrated by numerous lantern slides and moving pictures.

The President. The Secretary will read a resolution from the Municipal Health Officers Section.

The Secretary read the following:

Whereas, A considerable number of municipal health officers believe terminal disinfection at the conclusion of communicable disease is of questionable value and extravagant in practice; and

Whereas, A few municipal health officers of sound judgment and highest attainment have abandoned this practice as a prophylactic measure; therefore, be it

Resolved, That the Municipal Health Officers Section refer to the Executive Committee a recommendation that the American Public Health Association appoint a committee to study the end results and practice in communities where terminal disinfection is no longer practiced at the conclusion of cases of communicable disease. Referred to the Executive Committee.

Hon. Emil Seidel, Mayor of Milwaukee, read a paper entitled, "Social Economics and Public Health."

The President thanked Mayor Seidel for his very interesting and instructive paper.

The President. We will now take up the interrupted program of yesterday and will listen to a symposium on "The Present Organization of Work for the Protection of Health in the United States, Canada, Mexico and Cuba."

Dr. Walter Wyman, Surgeon-General, United States Public Health and Marine Hospital Service, spoke on this subject for the United States of America.

Dr. Frederick Montizambert, Director-General of Public Health, Canada, read a paper entitled, "The Present Organization and Work for the Protection of Health in Canada."

Dr. Charles A. Hodgetts, Medical Advisor, The Commission on Conservation, Canada, read a paper entitled, "The Canadian Commission of Conservation and Public Health."

"Organization of the Sanitary Service in the Federal Districts, Territories, Seaports, and Principal Frontier Cities of the Mexican Republic," by Dr. Eduardo Liceaga, President of the Superior Board of Health, Mexico, was read by the Secretary, in the absence of the author.

In the absence of Dr. Juan Guiteras, Director-General of Public Health, Cuba, Dr. Federico Torralbas, spoke on the Sanitary Department of Cuba.

The next in order was a symposium on the Relation of the University to Public Health.

The first paper was read by Dr. H. W. Hill, Minneapolis, Minnesota.

At the conclusion of his paper Dr. Hill moved that a committee be appointed by the Association to deal with this subject.

Professor E. H. S. Bailey, of Topeka, Kansas; Dr. W. F. Snow, Sacramento, California; Dr. Henry Albert, of Iowa City, Iowa; and Mr. B. R. Rickards, of Columbus, Ohio, discussed the paper and the discussion was closed by Dr. Hill.

At this juncture, Dr. John N. Hurty took the Chair temporarily.

Dr. Thomas R. Crowder, of Chicago, Illinois, then read a paper entitled, "The Study of the Ventilation of Sleeping Cars," which was illustrated by numerous stereopticon slides.

The paper was discussed by Dr. William A. Evans, of Chicago, and the discussion was closed by the author of the paper.

Dr. John A. Amyot, of Toronto, Canada, read a paper entitled, "The Laboratory in its Relation to Public Health."

A paper by Mr. John A. Kingsbury, of New York, entitled, "Mayors and Municipal Health Problems," was read by title.

Dr. William A. Evans, of Chicago, read a paper entitled, "Efficiency and Economy in Municipal Health Work."

The paper of Dr. Evans was discussed by Dr. Le Grand Powers, Chief Statistician, Bureau of the Census, Washington, D. C., who at the conclusion of his remarks asked for the appointment of a committee.

It was then moved and seconded that the Association create a committee to coöperate with the Census Bureau in establishing standard methods of computing the cost of municipal sanitation. (Carried.)

On motion, the Association then adjourned until 9 a. m. Friday.

FRIDAY, SEPTEMBER 9, 1910.

Fourth Day—Morning Session.

The Association met at 9:15 a. m., and was called to order by the President.

The Secretary. Applications for membership have been favorably acted upon by the Committee on Membership and the Executive Committee, as follows:

ACTIVE MEMBERSHIP.

Frank H. Carter, Cambridge, Mass.
William O. Owen, Washington, D. C.
Payn Bigelow Parsons, New York City.
Andrew J. Provost, Jr., New York City.
T. D. Tuttle, Helena, Mont.
William W. Walcott, Natick, Mass.
John C. Westernelt, Shelbyville, Ill.

ASSOCIATE MEMBERSHIP.

H. E. Dearhott, Milwaukee, Wis.
Francis Todd H' Doubler, Oxford, O.
Samuel E. Eliot, New York City.
Harry C. Gabriel, Columbus, O.
Harry B. Hommon, Chicago, Ill.
Earle V. Manuel, Milwaukee, Wis.
Geo. O. Murray, Lomah, Wis.

On motion, the Secretary was authorized to cast the ballot of the Association for the candidates named, which having been done, the candidates named were declared elected.

The Secretary. The following resolution is recommended for adoption, by the Executive Committee. There has already been appointed a committee to confer with the American Medical Association. The Executive Committee in considering the recommendation made by the President in his annual address deemed it proper to extend the scope of the functions of that committee, or of a similar committee, and therefore recommends that a committee be appointed by the Executive Committee to invite an interchange of views with similar organizations, and the appointment by them of similar committees in case they are of the same opinion, to bring up the matter of coöperation between national organizations working for the improvement of the public health, said committee to report at the next meeting of the Association.

Dr. Holton. I move that the resolution be adopted.

(Seconded and carried.)

The Secretary. There was referred to the Executive Committee yesterday the report and recommendations made by the Committee on Education of the Public as to the Communicability and Prevention of Gonorrhea and Syphilis. The Executive Committee instructed me to report back these recommendations in the following form:

1. The committee recommends the recognition, study and control of the prevalence of gonorrhea and syphilis, as with all other communicable and preventable diseases, in order to ascertain the distribution of these diseases.

2. An educational campaign for parents of all social classes and children of all ages and sexes. This teaching should be not only moral, but also medical in the widest sense. It will not do at present to rely on the moral argument.

(a) Proper distribution of circulars, pamphlets and other literature by state health departments through all suitable channels.

(b) State health departments to instruct all its local health officers in sexual matters and direct them to make a systematic effort to educate the people in their respective communities.

(c) State health departments to make a definite and determined effort to awaken and interest the medical profession in this fight against venereal diseases.

(d) State health departments to send out especially trained paid teachers and lecturers of their own, supported by exhibits and lantern slides, to address special meetings of parents, health officers, medical men, teachers and others in schools, colleges, churches, etc., on these and other preventable diseases.

(e) State health departments to encourage the organization of local leagues or associations whose purpose shall be the support of and control of a crusade against the spread of all communicable diseases: (1) Said societies to include every profession and walk of life. (2) To depend upon philanthropists for necessary funds rather than upon paid subscriptions for financial support.

(f) Health departments to interest and provide instruction in sexual matters for students of the upper grades: (1) By introduction of biology into the graded courses of all schools. (2) By introduction into the textbooks on physiology of upper grades instruction in reference to anatomy and physiology of the urinary and sexual organs. (3) By special instruction to normal school students who are to become instructors. (4) To impress upon the presidents, deans, preceptors and teachers of those subjects, the necessity of repeated instructions in reference to the communicability of syphilis and gonorrhea and to inculcate a morale of protection among the student body.

(g) To utilize health departments for the proper occasional presentation of the subject and to discourage the display of advertising matter which encourages the exposure to dangers in these diseases.

(h) To utilize church clubs, fraternal societies, trade unions, women's clubs, and especially mothers' clubs, for instruction of parents.

(i) Health departments to recommend the enactment of laws for: 1. Physical inspection and segregation of prostitutes. 2. Notification and report (by number, if desired) of venereal cases. 3. Physical examination of men before marriage; and that male applicants for marriage license be required, in order to obtain same, to submit to examination by a duly qualified physician to determine if they are free from venereal disease. 4. Keeping open free night dispensaries and maintenance of special dispensaries and hospitals for those diseases. 5. Making it a crime knowingly to spread venereal disease.

(j) Advocacy of temperance on account of the relationship between alcoholism and venereal diseases.

(k) Advocacy of personal cleanliness and venereal prophylaxis.

(l) Advocacy of early marriages.

THE PRESIDENT. You have heard the report of the Executive Committee which slightly amends the report read yesterday from the committee. The question will be on the adoption of the recommendations of the Executive Committee.

DR. HURTY. I move that these recommendations be adopted, as read.

Seconded and carried.

THE PRESIDENT. There is some question as to whether this committee should be continued or not.

DR. HILL. I move that the committee be continued for another year.

Seconded and carried.

THE SECRETARY. The Executive Committee recommends, in line with suggestions in the President's address, that a committee be appointed to consider and report next year a scheme for instruction in hygiene and sanitation in high schools and in colleges and universities, with a view to bringing the necessity for such instruction, with definite recommendations with respect thereto, to the attention of educational authorities, and that Dr. Probst be Chairman of that committee.

DR. HOLTON. I move that this recommendation be adopted.

(Seconded and carried.)

THE SECRETARY. A proposition was received from more than ten members of the American Public Health Association to form a section to be known as the Section on Sociology, to be organized with the following officers:

Chairman, Mr. John M. Glenn; Vice-Chairman, Mr. Lawrence Veiller; Secretary, Mr. Frederick Almy; Recorder, Dr. W. F. Snow; Council, Dr. Peter H. Bryce; Dr. George W. Goler, Dr. Herbert D. Pease, Dr. Frank F. Wesbrook, and Mr. A. M. Wilson.

The Executive Committee recommends that the request of these gentlemen to form such a section be granted.

On motion, the recommendation of the Executive Committee was concurred in.

The Secretary. A request was received from certain members for the establishment of a Sanitary Engineering Section of the Association. The request reads as follows:

To The Executive Committee of the American Public Health Association:

We, the undersigned members of the Association, deeming it expedient, in promoting the work of the Association and the cause of the public health, that a careful study shall be made of the advisability of forming a Section of the Association to embrace in its membership persons engaged in the practice of the several branches of Sanitary Engineering, hereby make petition, in accordance with Chapter 3 of the By-laws of the Association, for authority to proceed with the creation of such a Section, to be known as the Sanitary Engineering Section of the American Public Health Association, in the event that the committee to whom has been referred the question of the relation of Sanitary Engineer members to the General Association shall recommend the formation of such a Section.

(Signed)	C. O. Probst,	Samuel H. Durgin,
	J. L. Ludlow,	Peter H. Bryce,
	George C. Whipple,	H. D. Pease,
	George W. Fuller,	J. J. Kinyoun,
	H. M. Herbert,	Henry D. Holton,
	Rudolph Hering,	J. N. Hurty,
	J. L. Leal,	Chas. A. Hodgetts,
	H. W. Hill,	John S. Fulton,
	F. D. Bell,	John A. Amyot,
	C. A. Shore,	H. W. Long,
	W. A. Evans,	M. M. Seymour,
	J. J. Hogan,	Charles V. Chapin,
	Gardner T. Swarts,	Burt R. Rickards.
	Earle B. Phelps,	

This petition is recommended by the Executive Committee for adoption.

Dr. Holton. I move that this recommendation of the Executive Committee be adopted.

(Seconded and carried.)

The Secretary. The Executive Committee recommends the adoption of a resolution providing for the unification, in so far as unification may be possible, of the Constitutions of the several sections. The Constitution of each Section deals with certain matters that are covered by the constitutions of every other Section, and in order to reduce them to as near

perfect harmony as possible, the Executive Committee recommends the endorsement of this resolution so that the matter may be studied before the next meeting of the Association.

The President. What will you do with the recommendation?

On motion, the recommendation was concurred in.

The Secretary. The Executive Committee submits the following amendments to the Constitution and By-laws: These will lie over until the next annual meeting.

(1) Amend Article III, Section Six, of the Constitution, by adding, "And to such others as the Executive Committee may recommend as presenting satisfactory qualifications in lieu of the three years' service specified above."

(2) Amend the By-laws, Chapter 5, by adding after "present" the following: "Provided, however, that during the interval between any two meetings of the Association any applicant whose application has been reported favorably by a vote of not less than two-thirds of the Committee on Membership may, by unanimous vote of the Committee of Seven, be elected to membership and such applicant shall become a member upon the payment of the annual dues for the current year."

(3) Amend Article III of the Constitution by adding a new section, to be known as Section 8, as follows, and making such verbal changes in the Constitution and By-laws as may be necessary to make them conform therewith: Section 8. Any federal, state, or municipal department, bureau, or service, and any association or other organization, in any of the countries represented in this Association, engaged in the conservation and promotion of public health, may, upon application, be elected to membership in the same manner as any person, and shall thereupon have all rights, privileges, and obligations of other members, and shall be entitled to participate in all proceedings of the Association through a delegate duly authorized in writing for that purpose. Duly appointed delegates from such departments, bureaus, services, associations, or other bodies may present papers approved by the Program Committee of this Association and engage in the discussion of papers read at its regular meetings, and members of such departments, bureaus, services, associations, or other bodies, may receive the publications of this Association upon such terms as may be agreed upon by its Publication Committee.

The Secretary. The Executive Committee appointed a sub-committee to consider the advisability of publishing a journal. The sub-committee made its report to the Executive Committee and it was adopted by that body and submitted to the Association at this time for adoption.

The report is as follows:

REPORT OF COMMITTEE ON JOURNAL.

Your committee begs to recommend:

1. That a journal to be known as the "Journal of the American Public Health Association" (American Journal of Public Hygiene) be established by the A. P. H. A.

2. That this Journal be published monthly; the first issue to appear in January 1911.

3. That an editor be appointed to edit the Journal which shall include,

(a) The papers, and abstracts of papers and proceedings read before the Association, including the several Sections, as approved of by the Committee on Journal to be hereafter appointed by the Executive Committee.

(b) Also special editorials prepared under the direction of said committee.

(c) Papers and reports of such associations as have representation or affiliation with the A. P. H. A., when approved of by the said committee.

(d) Such reports of the work of Federal Departments and Bureaus of Health in the several countries represented in the Association, of state and provincial boards of health, and of local boards of health as may be received by the editor and when space permits.

(e) Editorial notes on public health work throughout the world, and such other news items and book reviews as may be found interesting.

4. That there shall be a committee of three to be designated "Committee on Journal" who shall be appointed for three years, except the first appointments which shall be one, two and three years respectively. This committee shall be entrusted with the business direction of the Journal, and shall publish the Journal under such instructions and powers as it may receive from the Association.

5. That the Committee be empowered and instructed to appoint some member of the A. P. H. A. as managing editor, whose term shall be fixed for not longer than one year, and in case of death, or removal by the committee, shall be replaced by some other member for the remainder of the year.

6. That to secure such an editor and to provide for publication expenses, it is recommended that the Committee on Journal be empowered to draw for all expenses attending publication of the Journal upon the Committee of Seven, who shall authorize the issuance of checks including an amount equal if necessary to the amount paid for publication for the Journal during the past year of some sixteen hundred dollars, and an extra amount not exceeding $2,000, above the amount expended for the publication of the transactions last year.

7. That this expenditure is recommended as a basis for the proposed establishment of the Journal upon the following estimate, based upon the cost of last year's transactions, the cost of the editor's office being added to last year's expenditures:

(1) Salary of Editor	$ 2,000.00
(2) Publication of Transactions, (1,500 copies)	1,600.00
(3) Extra matter, including Massachusetts Association of Boards of Health, and advertising	900.00
	$ 4,500.00

As an offset to this expenditure, the taking over of last year's assets of the American Journal of Public Hygiene would result in the following:

1,500 copies of Journal printed, and sold:

750 volumes, to members at $2.00	$ 1,500.00
300 volumes, to members Massachusetts, etc., at $1.00	300.00
200 subscribers, at $1.50	300.00
Advertisements	360.00
Sale of Transactions	400.00
Sale of Pamphlets (estimated)	75.00
	$ 2,935.00

8. To estimate whether the Association can afford to enter into this undertaking, it may be stated that the treasurer's report shows an amount on hand for membership fees, not including sale of transactions, of $2,640, not taking into account any trust funds. Should it further be found practicable for the Association to undertake this publication on the same basis of expense as that of last year, there would result as a working capital, the following:

(a) The whole time services of a paid editor.

(b) A paid clerical staff to assist in the regular publication of the Journal; to also correspond with all health authorities to the end of increasing subscribers; also to the obtaining of advertisements and increasing membership through new subscribers to the Journal.

(c) A regularly descending ratio of cost per volume and per issue in proportion to the increasing number of subscribers; thus if 1500 copies of last year's issue cost say $500, an extra 500 would not cost more than an extra $100.

(d) That in proportion as the subscribers are increased, the value of the advertising increases in geometrical ratio.

All of which is respectfully submitted,

H. D. Holton,
P. H. Bryce,
G. T. Swarts.

The President. You have heard the report of the Executive Committee with regard to the establishment of a journal under the terms named in the report. What is your pleasure?

Dr. Bryce. I move its adoption. (Seconded.)

Dr. James R. Kean. There is one point I would like to call attention to in this connection, and that is the trouble the editor of such a journal will get into with the Postoffice Department in order to get the journal carried as second class matter. The Postoffice Department is rigid about certain requirements. The subscription for the journal would have to be separate from the dues, otherwise if that is not carried out they will not carry the journal as second class matter, and it will greatly increase the cost of the journal. The Journal of the American Medical Association is having trouble along this line as well as other journals. If we are determined to publish a journal it seems to me very essential that we should fix the subscription price and proportionately reduce the membership fee. The Postoffice Department will not stand for a nominal subscription price. It has to be the same for outsiders as well as members and if we are determined to publish a journal we should at this meeting introduce a proposed change to the Constitution which would make the subscription say three dollars and reduce the charge for membership in the Association two dollars and separate one from the other.

Dr. Holton. The committee had that under consideration and we fixed the price of the Journal to members and others at two dollars, and that would be out of the fee of membership, reducing the membership fee proportionately. This is a matter of detail, however, which can be fixed by the committee which is appointed to look after the Journal.

Dr. Kean. It requires a change in the Constitution though. The subscription for the Journal and the membership fee have to be entirely separate.

Dr. J. J. Kinyoun, Washington, D. C. These are a series of resolutions of vital interest to every member of the Association, and I fear many of the members have not clearly grasped what is intended in these resolutions. I think, before the adoption of them if the Association so wills, we should know exactly what the several paragraphs mean. Therefore, I would make a motion that this report be read paragraph by paragraph or section by section.

Dr. Holton. I second the motion, and I think it would be a good idea to call upon the Secretary of the Committee to make such explanation as may seem necessary during the reading of the various sections of this report.

(Motion put and carried.)

The Secretary read Sections 1 and 2 of the report which were adopted.

Section 3 was read, and it was moved and seconded to amend by saying "proceedings of the general meeting and its sections." (Carried.)

The Secretary read Sections b, c, d and e.

Dr. Kinyoun. I move to amend Section b, by adding "The Secretary of the Association shall be ex-officio a member of the Committee on Journal."

Dr. Bryce. I second the motion. (Carried.)

The Secretary. The Constitution provides that there shall be a Committee on Publication to consist of the Secretary, and the Chairmen of the Publication Committees of the Sections. We have at the present time, however, as representatives on that committee one from the Laboratory Section, one from the Vital Statistics Section, and one from the Municipal Health Officers' Section. Next year we will have a representative from the Section on Sociology and probably from the Sanitary Engineering Section, who under the Constitution are absolutely entitled to a voice in the Publication Committee. I am not objecting to the Secretary being put on this committee, but it seems the Sections are of such vital interest and their views so diverse that they can hardly be ignored.

Dr. Hemenway. I understand the Publication Committee passes on papers that are read.

The President. Yes.

Dr. Kinyoun. As the Secretary is Chairman of the Publication Committee he should be ex-officio member of the Journal Committee. He simply would transfer to the Journal Committee the results of the Publication Committee. There is no conflict as I see it, and there is no necessity for putting the section chairmen on the Journal Committee, who send their reports to the general Publication Committee.

The President. The question is on the adoption of Section b, as amended to include the Secretary of the Association as ex-officio a member of the Committee on Journal.

(Carried.)

Sections c, d and e were read and adopted.

Section 5 was amended to insert the word "resignation."

Section 6 was read and adopted.

Dr. Wilbur. I move the adoption of the report as a whole inasmuch as it has been adopted section by section. (Seconded.)

Dr. Neff. As I understand it, the appointive power of the editor and Journal Committee is not mentioned.

The President. The Journal Committee is appointed by the Executive Committee; the committee of three is to select the editor.

The Secretary reverted to Section 4 of the report regarding the committee of three, and pointed out that the Secretary cannot be appointed by the Executive Committee. He is an addition to the three members. The Secretary is an elective officer.

Dr. Wilbur. I move to add the President to the Committee, making five members.

(Seconded and carried.)

Dr. Wilbur. I now wish to renew my motion to adopt the report as a whole. (Carried.)

The Secretary. The Executive Committee recommends the adoption of the following from the Municipal Health Officers Section:

Whereas, A considerable number of municipal health officers believe terminal disinfection at the conclusion of communicable disease is of questionable value and extravagant in practice; and

Whereas, A few municipal health officers of sound judgment and highest attainment have abandoned this practice as a prophylactic measure; therefore be it

Resolved, That the Municipal Health Officers Section refer to the Executive Committee a recommendation that the American Public Health Association appoint a committee to study the end results and practice in communities where terminal disinfection is no longer practiced at the conclusion of cases of communicable disease.

It was moved that the recommendation be concurred in. (Seconded.)

Dr. Henry Albert, Iowa City, Iowa. I move to amend that the Committee not only investigate the terminal results of those cases where they do not disinfect but also those where they do disinfect, in order that a comparison may be made. (Seconded.)

The original motion as amended was carried.

The Secretary. The following resolution offered by Dr. H. W. Hill, relative to universities and departments of health, has been recommended by the Executive Committee to the Association for adoption:

Resolved, That this Association appoint a committee of representative men to consider this subject fully in all its aspects and to report the basic principles upon which such relationship may be established, perhaps even to present a model contract which may be adopted or adapted by universities and state boards of health in seeking alliance with each other.

Dr. Swarts. I move the recommendation of the Executive Committee be concurred in.

(Seconded and carried.)

THE SECRETARY. It was moved and seconded that this Association appoint a committee to coöperate with the Census Bureau in establishing standard methods of accounting for municipal sanitation.

This resolution was recommended to the Association by the Executive Committee for adoption.

It was moved and seconded that the resolution be adopted. (Carried.)

THE SECRETARY. The following resolution offered by Dr. Hurty is recommended to the Association by the Executive Committee for adoption:

Resolved, That this Association offers and records its hearty approval and commendation of the educative work carried on by the *Ladies Home Journal* regarding the necessity and ways of teaching children the truth about reproduction and sexual life.

DR. ALBERT. I move that this resolution be adopted. (Seconded and carried.)

THE SECRETARY. The report of the Committee of Seven has been approved by the Executive Committee.

REPORT OF THE COMMITTEE OF SEVEN.

MILWAUKEE, WIS., Sept., 5 1910.

To the Executive Committee:

In compliance with the requirements of Section 4 of the Constitution, the Committee of Seven respectfully submits the following report of its operations since the Association last met, October 19-22, inclusive, 1909:

Section 7, Article V, of the Constitution, provides that the Committee on Membership shall consist of the Treasurer of the Association, as Chairman, the Chairmen of the Membership Committees of the Sections, and two additional members appointed by the Executive Committee. The Executive Committee having adjourned without having appointed such additional members, the duty of making such appointments devolved upon the Committee of Seven. The Committee of Seven therefore, appointed Dr. W. A. Evans, of Chicago, Illinois, and Dr. C. A. Harper, of Madison, Wisconsin.

The Executive Committee, at the Richmond meeting, having referred to the Committee of Seven the matter of publishing the proceedings, the Committee of Seven to act in conjunction with the Publication Committee with instructions to make best arrangements possible, considering financial conditions, for their publication, preferably in the American Journal of Public Hygiene, arrangements were made for their publication in the Journal named, as follows: The American Journal of Public Hygiene to print and publish in its regular issues, preceding the next regular meeting

of the Association, such papers, etc., as may be turned over to it by the Publication Committee, and in such order as the Publication Committee may direct; the American Public Health Association to pay therefor at the rate of $2.50 per page for running reading matter for the first four hundred pages, $2.25 per page for the next two hundred pages, and $2.00 per page for all subsequent pages; it being understood, however, that tabular matter is to be paid for at the rate of $2.50 per page additional for 8-point, and $4.00 per page additional for 6-point type; and that all engravings, electrotypes, etc., and cost of authors' corrections shall be paid for at cost. It was further understood that the Publication Committee should supply the Journal, in so far as possible, with an approximately equal amount of copy for each issue, and that copy from the General Association and from each of the Sections should be represented in each issue. The American Journal of Public Hygiene agreed to furnish reprints of authors' papers to authors at cost, and to send the Journal regularly for the year 1910 without cost to all members of the Association in good standing, whose names appear on a list supplied by the Treasurer of the Association prior to January 1, 1910; any additions or subtractions from said list to be submitted by the Treasurer on or before the 15th days of January, April, July and October. The Journal further agreed to furnish to the Association 150 reprints of the American Public Health Association papers and proceedings at a cost of $6.00 per signature of 16 pages, reprints to be delivered flat and ready for folding and binding. It was understood that complete copy should be in the hands of the Journal on or before March 1, 1910. Under this agreement there have been published to date in the American Journal of Public Hygiene 576 pages, at a cost of $1,438.40. The 150 bound copies of the Transactions will cost for printing about $216.00 and for binding $30.00. It has, therefore, cost the Association $1,438.40 to print and distribute to its members, in magazine form, approximately 694 copies of the Transactions. The publication and distribution of the 150 bound copies will cost approximately $246.00, plus cost of transportation. It will, therefore, cost the Association approximately $1,684.40, plus cost of transporting 150 bound volumes of Tranactions, to publish and distribute its Transactions for the year 1909.

The Executive Committee having adjourned without fixing the time for the 1910 meeting, the Committee of Seven, in accordance with Chapter 1 of the By-laws, fixed the time for said meeting as September 5 to 9, inclusive, after having conferred with the Chairman of the Local Committee on Arrangements and the Secretary-General of the International Congress on Hygiene and Demography.

The Committee of Seven authorized the Secretary to enter into a contract with Mr. William Whitford, of Chicago, Illinois, for reporting the proceedings of the Milwaukee meeting, at the rate of $10.00 per day for taking shorthand notes, and twenty-five cents per folio of 100 words for furnishing two copies of the typewritten transcript, the Association to defray railroad expenses.

Section 4, Article V, of the Constitution, providing that the Committee of Seven shall determine the membership of the Advisory Council, the Committee authorized the Secretary to correspond with various federal, state, provincial and district members and prospective members of the Association, in order that the organization of the Advisory Council might be determined as promptly as possible.

In view of the apparent salability of the Reports of the Committee on Standard Methods for the Bacterial Examination of Milk and on Standard Methods for the Examination of Air, the Committee of Seven authorized the American Journal of Public Hygiene to print the final reports of said Committees, bound together in one pamphlet of about 48 pages, on high grade (No. 70) book paper, and bound with a good paper cover; the same to be sold by the Journal for twenty-five cents apiece, the Journal to turn over to the Association one-half of its receipts after deducting the cost of printing, mailing, handling, etc. An edition of 1,000 copies was authorized, with the understanding that it would be necessary to sell 200 copies to cover the cost of publication, before there would be any profit to divide. This represents the cost of the entire edition, plus the cost of selling the first 200 copies; at 25 cents each this would amount, of course, to $50.00, as the approximate maximum possible cost to the Association. Under this agreement, it was understood that should the sale of the reprints be less than the amount necessary to cover the total cost, the Association would make up the deficit to the American Journal of Public Hygiene. An itemized account of receipts and expenditures is to be rendered by the Journal.

The Committee of Seven authorized the Secretary to correspond with all national organizations now interested in the prevention of disease and the conservation and promotion of health, with a view to the development of methods whereby the energies and funds of these organizations may be conserved and their efficiency increased. This action has resolved itself thus far into the symposium which forms a part of the program for the Milwaukee meeting, on "The Inter-relation of National Organizations Working in the Interest of Health."

The Association having been asked by the authorities promoting the International Hygiene Exhibition, Dresden, 1911, to organize a national

committee to see that the United States is properly represented at that exhibition, the Committee of Seven authorized the President and Secretary to call a meeting of those likely to be interested, in conjunction with the 1910 meeting. The Association assumes no responsibility in the the case beyond the calling of this meeting and the lending of its moral support.

The Committee of Seven regrets very much to record in this report the death of Prof. Franklin C. Robinson, one of its members, on May 25, 1910. The Committee desires to record its appreciation of the services rendered by Prof. Robinson and its grief because of his untimely death.

Respectfully submitted,

(Signed), C. O. PROBST, *Chairman.*
WM. C. WOODWARD, *Secretary.*

DR. HILL. I move that the report be accepted.

(Seconded and carried.)

THE SECRETARY. The next item is an amendment to the By-laws offered yesterday by the Executive Committee as follows:

After the last word in Chapter 10 insert the words: "The Committee of Seven shall have the power to make such changes, and such changes only, in the By-laws of the Association as may be required to adapt them to the rules and regulations of the United States Postal authorities. Such changes as the Committee of Seven shall make shall be presented to the Association, at its next regular meeting, for ratification."

DR. HILL. I move its adoption.

(Seconded and carried unanimously.)

MR. RICKARDS. I move that the action taken on this motion be sent to the Third Assistant Postmaster General.

(Seconded and carried.)

THE PRESIDENT. Are there any other committees to report at this time? If not, the next in order is the reports from the Sections as to their officers.

The Secretary then read the following list of officers of Sections:

Laboratory Section. Chairman, Dr. J. F. Amyot; Vice-Chairman, Dr. John F. Anderson; Secretary, Mr. B. R. Rickards; Recorder, Dr. H. D. Pease; Council, Drs. W. R. Stokes, D. L. Harris, D. G. Revell, H. W. Hill, C. A. Shore, and Mr. J. O. Jordan.

Vital Statistics Section. Chairman, Dr. Wilmer R. Batt; Vice-Chairman, Dr. C. V. Chapin; Secretary, Dr. F. L. Watkins.

Municipal Health Officers Section. Chairman, Dr. A. J. Douglas; Vice-Chairman, Dr. Federico Torralbas; Secretary, Dr. E. C. Levy.

THE PRESIDENT. The reports of the Sections are now before the Association for approval.

It was moved and seconded that the reports as read be approved. (Carried.)

THE PRESIDENT. The report of the Advisory Council will be read by Dr. Hill.

REPORT OF THE ADVISORY COUNCIL.

The Council met at the Auditorium, Milwaukee, Wis., September 8, 1910, at 6 p. m., and organized by the election of Dr. William Bailey, of Kentucky, as Chairman, and Dr. H. W. Hill, of Minnesota, as Secretary.

After roll-call and verification of members, the following nominations were made:

For President, Mr. Rudolph Hering, of New York, by H. M. Herbert; Dr. John N. Hurty, of Indiana, by Dr. J. J. Kinyoun; Dr. Robert M. Simpson, of Manitoba, by Dr. Peter H. Bryce; Dr. C. A. Hodgetts, of Ontario, by Dr. J. A. Hutchinson.

The nominations were then closed.

On the first ballot, 52 votes were cast as follows: Hering 7; Hurty, 10; Hodgetts, 11, and Simpson, 24. The lowest name was dropped. On the second ballot, 53 votes were cast. Hurty received 9; Hodgetts, 14, Simpson, 28, and Simpson was declared elected.

For First Vice-President, Dr. Fernando Lopez, of Mexico City, was elected without opposition; Second Vice-President, Dr. John F. Anderson; Third Vice-President, Dr. G. A. Bading; Secretary, Dr. Wm. C. Woodward. For Treasurer no vacancy was declared, and no election held.

For three members of the Executive Committee, the following nominations were made: Dr. Francisco Bernaldez, Dr. M. M. Seymour, Dr. Julio F. Arteaga, Col. J. R. Kean, Dr. C. A. Hodgetts, the first three being elected.

For honorary membership, the following were nominated and elected unanimously: President William H. Taft, Col. Theodore Roosevelt, Mr. George Eastman, Rochester, N. Y., and Hon. Clifford Sifton, Canada.

For place of meeting, invitations were received from Atlantic City, Pasadena, Santa Barbara, San Francisco, Los Angeles, St. Louis, Colorado Springs, Cincinnati, Rochester, and Havana, the latter oral and presented by Dr. Torralbas. On the first ballot Havana received 33 of the 52 votes and was declared the place of meeting for 1911.

(Signed) WILLIAM BAILEY, *Chairman*,
H. W. HILL, *Secretary*.

Dr. Wilbur. I move that the report be adopted.

(Seconded and carried.)

Dr. Swarts. I move that the Secretary be instructed to cast the ballot of the Association for the officers and honorary members nominated in the report of the Advisory Council.

(Seconded and carried.)

The Secretary then cast the ballot of the Association as directed, and the officers and honorary members named were declared duly elected.

Havana, Cuba, as the next place of meeting was endorsed by the Association.

The President-elect, Dr. Simpson, was called for. He said:

Mr. President and Members of the American Public Health Association:

To say that I am not insensible of the honor that you have conferred upon me and my countrymen through this election would not be putting it in the proper light. I assure you I feel extremely grateful for the distinguished honor you have conferred upon me. I shall try in the next year to put into my efforts sufficient vim and force to make up in a measure what I have failed to do in the past. I hope, gentlemen, as a body you will give the Association all the assistance that it is possible for you to give in the next year, so that our meeting in Havana will be a representative one, and one of which we shall all be proud.

Again I thank you for the honor you have conferred upon me. (Applause.)

The President. It might be well to call a meeting of this Association for the purpose of organizing a national committee so that the United States may be properly represented at the International Hygienic Exhibit, to be held in Dresden, in 1911.

Dr. Holton. I move that this question of the Dresden Conference be considered during the afternoon.

(Seconded and carried.)

Col. Ludlow presented the following resolution:

In view of the great public value attaching to the wide circulation of all publications devoted to the dissemination of the public health literature; therefore, be it

Resolved, That this Association petition the Congress of the United States to pass an Act extending the application of mailing rates, which apply to newspapers, magazines, and other second class matter, to all journals, magazines and circulars which are devoted exclusively or substantially to the circulation of public health literature, whether or not

such journals, magazines, and circulars are distributed through the United States mail gratis or to bona fide subscribers. (Referred to the Executive Committee.)

The Association then held a symposium on Sanitary Engineering Problems.

PROFESSOR WILLIAM T. SEDGWICK, of Boston, Massachusetts, contributed a paper entitled, "The Correlations of Physicians, Engineers, and other Experts in Public Health Work."

MR. RUDOLPH HERING, of New York City, presented a paper entitled, "Modern Practice in Garbage Disposal."

These papers were discussed by Dr. Hutchinson, and the discussion was closed by Mr. Hering.

At this juncture, Dr. John S. Fulton asked unanimous consent to make a motion that the members of the American Public Health Association interested in the International Hygienic Exhibit at Dresden be allowed to hold a meeting at the close of this session in the room in which the Section on Vital Statistics met. (Seconded.)

DR. AMYOT. I move to amend that the Committee meet now instead of this afternoon.

DR. HOLTON. I second the motion.

DR. FULTON. I accept the amendment.

Mr. Rudolph Hering then addressed the Association briefly on the Dresden Hygienic Exhibit, saying that those who had the matter in charge were going to try to make this a very large and unusually fine exhibit and he hoped America would be properly represented.

The original motion as amended was then put and carried.

MR. EARLE B. PHELPS, of New York City, read a paper entitled, "The Chemical Disinfection of Water and Sewage."

DR. HERBERT D. PEASE and MR. A. J. PROVOST, Jr., of New York City, presented a joint paper entitled, "The Sanitary Supervision of Labor Camps within the Drainage Area of Public Water Supplies."

A paper by Mr. George A. Johnson, of New York City, entitled, "The Hypochlorite Treatment of Public Water Supplies; Its Adaptability and Apparent Limitations," was read by title and referred to the Publication Committee.

MR. E. N. EZEKIEL, of Richmond, Virginia, read a paper entitled, "The Purification of the Water Supply of Richmond, Virginia, by Sedimentation and Coagulation Without Filtration."

The following papers were read by title: "Some of the Larger Aspects of the Work of the Metropolitan Sewerage Commission," by Dr. George

A. Soper, of New York City; "Mining Hygiene; Brief Considerations Relative to the Prophylaxis of Ankylostomiasis," by Dr. Javier Hoyo, of Pachuca, Hidalgo, Mexico.

Major F. F. Russell, Medical Corps, United States Army, Washington, D. C., read a paper entitled, "Anti-Typhoid Vaccination in the Army."

The following papers were read by title: "Anti-Typhoid Vaccination in Civil Life," by Dr. Hiram Byrd, of Jacksonville, Fla.; "The Health Conditions on Emigrant Ships," by Dr. Peter H. Bryce, of Ottawa, Canada.

DR. JOHN S. FULTON. As the result of the action of the meeting just convened to consider the Dresden Hygienic Exhibit, I wish to offer the following resolutions:

Resolved, That it is the sense of the American Public Health Association that the participation of the United States in the International Hygienic Exhibition at Dresden can best be conducted by the Committee on Organization of the International Congress of Hygiene and Demography;

Resolved, That a committee be appointed by the American Public Health Association to coöperate with this Committee on Organization and to enlist the coöperation of members of this Association; that it is imperatively necessary that early action be taken by the committee of the American Public Health Association in regard to obtaining the necessary appropriations, and that all federal departments, states, and local municipalities likely to participate, be at once notified of the official invitation and scope of the Dresden exhibit.

I move the adoption of these resolutions.

(The motion was seconded by several and carried.)

DR. HURTY offered the following resolutions of thanks:

Resolved, By the American Public Health Association in thirty-eighth annual session assembled in Milwaukee, September 5 to 9, 1910, that our most heartfelt thanks are offered to the people and the governing authorities of this beautiful and hospitable city for the hearty welcome and the many courtesies we have received from them. We also thank the press for its excellent report and kindly words for our work and our efforts. We thank the ladies of Milwaukee for their courtesies and beautiful attentions to the ladies of the Association. We thank the Local Committee of Arrangements for their admirable arrangements, for their devotion to our comfort and pleasure, and lastly we thank Dr. Bading, whose untiring and masterful management, prompted and supported by his good heart, and his strong personality and force, has spread above us a canopy of roses and made us happy and efficient in our work in Milwaukee.

On motion, the resolutions were adopted.

At this juncture, the retiring President, Dr. C. O. Probst, said: I wish to express on my own behalf my sincere thanks to the members of this Association for the cordial support they have given me during this meeting. For ten years you used me as your Secretary and then did me the honor to make me your President. Now I am going to take my place in the ranks and become a boy again. (Applause.)

Dr. Holton. I move, Mr. Secretary, that a vote of thanks and appreciation be extended to Dr. Probst for the efficient and impartial manner in which he has managed the affairs of the Association.

This motion was seconded by several and carried unanimously.

There being no further business to come before the meeting, on motion, the Association adjourned to meet in Havana, Cuba.

C. O. Probst, *President.*

Wm. C. Woodward, *Secretary.*

RESOLUTIONS.

Copy of Resolutions presented by the Committee of the American Public Health Association to the Conference of State and Provincial Boards of Health at Washington, D. C., May 1, 1910, and formally adopted by the Conference on that date.

At the last meeting of the American Public Health Association the following resolutions were adopted:

Whereas, In order to enlist the help of individuals and of corporate bodies in carrying out sanitary measures it is advisable to have laws and rules and regulations so framed as not only to be efficient but also to impose as light a burden as possible upon our people, and

Whereas, At present the laws and rules and regulations of the various states of the Union designed particularly to restrict the spread of tuberculosis require different forms of notices for this object, some going so far as to order a copy of the organic law regulating spitting to be printed and displayed in each railroad coach, and

Whereas, Railway coaches frequently traverse a number of states having different laws, the posting of notices of the same makes it burdensome for the transportation companies, disfigures their cars, and also creates additional places for the collection of dust.

It is Recommended that the several states adopt a terse notice which will satisfy the laws of all the states, and that those states which have laws requiring the display of the entire law amend such laws so as to permit the adoption of a uniform notice forbidding spitting, and

WHEREAS, The State and Provincial Boards of Health are interested with us in all health measures, be it

Resolved, That these resolutions be drafted and entrusted to a committee to present to the next annual Conference of State and Territorial Boards of Health with the request that it adopt the same and communicate its action to the respective Boards and Departments of Health of each state in the Union.

In accordance with the above resolutions the Committee of the American Public Health Association presents to this body today the following resolutions:

Resolved, That, in concurrence with the American Public Health Association, the Conference of State and Provincial Boards of Health approve of the following uniform anti-spitting sign for railway coaches:

"THE LAWS AND REGULATIONS OF THE STATES FORBID SPITTING IN PUBLIC PLACES UNDER PENALTY."

SAMUEL G. DIXON,
C. A. HARPER,
ENNION G. WILLIAMS.

YELLOW FEVER HAS DISAPPEARED FROM THE MEXICAN REPUBLIC.*

By EDUARDO LICEAGA, M. D.,
Superior Board of Health, Mexico City, Mexico.

In the report which I forwarded last year to the meeting of the American Public Health Association held at Richmond, I pointed out that yellow fever had not presented itself in Vera Cruz since the 11th of February of that year, but that isolated cases still existed in the State of Yucatan. These, without forming any epidemic focus, daily became less frequent and were reduced to the city of Merida and some small towns in the State. But from the 20th of December, 1909, not a single case of yellow fever has been observed either in the State of Yucatan or in any other part of the Mexican Republic, and consequently we can declare that this disease has been suppressed in our country.

In spite of the success obtained, the sanitary service continues to act with the same regularity as in previous years, although it is now directing its energies especially against malaria. This disease we hope to extinguish within the near future, as has been done on the Canal Zone of Panama, through the efforts of the American Government.

*Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

THE EFFECT OF A HIGH TAX ON THE STRUGGLE AGAINST ALCOHOLISM.*

By RAFAEL SERRANO, M. D.,
Puebla, Mexico.

Those who have had an opportunity to take a direct part in the struggle against alcoholism can verify a statement of importance to all who are interested in public health questions: Part of the people are opposed to the most practical and efficient means of combatting alcoholism. This opposition, in my opinion, is due to the fact that while the majority of people theoretically recognize the harm caused by alcohol, one of the most terrible poisons, they fail to realize the extent and true importance of such harm. For this reason I fear that the means I submit to you as one of the most efficient—perhaps the most efficient—for combating alcoholism, may meet strong opposition, not from the members of this Association, from whom I dare expect a complete support, but from a part of the people.

In the city of Puebla, the capital of the state that I represent, there exists a society called the "Anti-alcoholic League," an organization founded by Jose Maria de Ita, M. D. For two years this league has made great efforts to carry on its work by means of the press, lectures, work in public schools, festivals, and other forms of publicity. From the results so far obtained I have a strong conviction that the campaign against alcoholism should be taken into the industrial and commercial fields. I believe failure to do this will bring but a meager result, out of proportion to the efforts which are being made, and what is even more significant, out of proportion to the magnitude of the dangers of alcoholism. What those dangers are the following statistics indicate:

The production of alcoholic drinks in Mexico was 237,481,447 liters during the year 1879. During the fiscal years 1885 to 1895 the production of alcoholic drinks in the Republic was 8,019,531,640 liters valued at $336,425,814.45. During the fiscal year 1888–1889, 9,749,648 liters of intoxicating liquors were imported into Mexico. During the fiscal year 1892–1893, 13,813,276 liters were imported; 1893–1894, 11,442,091 liters; 1894–1895, 12,064,299 liters. The value of this liquor manufactured during these five years was $61,469,335. The amount was 4,063,628

* Read at 38th Annual Meeting of American Public Health Association, Milwaukee, September, 1910.

liters more than for the same period of time before, that is, one-third of the whole amount. Adding the alcoholic drinks imported to those produced in the country in the fiscal year 1892–1893, we have a grand total of 815,940,701 liters consumed, with a value of $51,939,904.65.

The following table shows the number of breweries and distilleries existing in the Republic during the year 1908–1909:

State.	Manufactories.	Liters Produced.	State.	Manufactories.	Liters Produced.
Federal District	2	2,915,270	Quintana Roo	1	26,239
Durango	23	235,798	Tabasco	40	544,166
Guanajuato	31	6,920,319	Tamaulipas	46	173,398
Hidalgo	154	996,295	Vera Cruz	255	8,247,911
Mexico	11	174,770	Yucatan	8	243,643
Morelos	16	6,363,722	Baja California	4	15,667
Puebla	72	3,247,837	Colima	3	76,914
Queretaro	24	182,935	Chiapas	201	1,257,130
San Luis Potosi	85	2,778,748	Guerrero	39	1,187,214
Tlaxcala	9	117,904	Jalisco	73	1,986,658
Zacatecas	19	1,288,967	Michoacan	30	560,293
Coahuila	38	733,517	Oaxaca	96	700,340
Chihuahua	16	82,424	Sinaloa	51	880,403
Nuevo Leon	28	221,911	Tepic	10	469,980
Sonora	56	843,151			
Campeche	7	96,580	Total	1,448	43,600,104

The Law of May 4, 1895, required producers of distilled drinks whose industrial installation was worth over $50.00 to pay a tax, (distributed), amounting to $500,000.00 per annum; and required small producers whose distilling installation was worth less than $50.00 to pay a tax of two cents every month on each liter of liquor produced.

The Law of May 12, 1896, established a tax in the Federal District, on "pulque," "aguamiel," and "tlachique"—fermented drinks from the agave plant—of eighteen cents to each keg of 27 liters, 376 milliliters capacity.

The Law of Patents, published by the government of the State of Puebla, November 8, 1888, taxes the alcohol distilleries from $5.00 to $150.00—the minimum and maximum tax—every month; this law also calls for a tax on "pulque" (highest grade) sales places, of from $5.00 to $500.00, a tax on the selling places of common grade "pulque" from 50 cents to $100.00, and on the wine selling and other liquor places, a tax of from $1.00 to $30.00 is exacted. The Law of March 24, 1903, taxes the "tinacales," or places where "pulque" is manufactured, $1.00 to $25.00 monthly. The Law of June 23, 1910, sets a duty of $2.14 on each 250 kilograms of "pulque" introduced into the State.

The table given below shows the data of the distributed amount taxed on alcoholic drinks in a period of five fiscal years from 1904–1905 to 1908–1909:

Fiscal Years	Registered Factories	Number of Distilling Places
1904–1905	2,300	2,341
1905–1906	2,147	2,557
1906–1907	1,626	2,316
1907–1908	1,872	2,000
1908–1909	1,905	2,374

Capacity of Alembics	Produce of Alcohol	Produce of Taxes
1,372,741	35,704,582 liters	$1,222,547.89
1,286,913	39,786,526 liters	921,715.79
1,393,456	42,583,479 liters	813,226.64
1,174,679	48,217,142 liters	830,426.67
1,386,953	44,865,241 liters	863,583.45

From the data shown it is evident that the production, and consequently the consumption, of alcohol has a tendency to increase very rapidly, as, save a few slight exceptions, the general movement is upward. And, moreover, these data show that, in Mexico, the duties or taxes have not succeeded in diminishing the consumption of alcoholic drinks. It is not to be supposed that the legislators have made it a point to use the taxing power as a weapon against alcoholism; and, if they have had such an idea in mind, the result has not been satisfactory. Undoubtedly the legislators have believed that duties and taxes on this article should be imposed in order to have the manufacture and sale of alcohol contribute proportionately to the revenues, the same as does any other article of industry and commerce. But this is probably not their only, nor even their main motive; alcohol is not merely an industrial or mercantile article, but it is a most terrible poison—perhaps, taking into consideration its extent and effects, the most deadly of poisons, which menaces the interest, the health, and the very life of the people addicted to its use; and this fact should serve as a starting point in fixing the taxes and duties on alcoholic drinks. What is alcohol used for? Almost invariably as a drink. Of the more than eight hundred thousand liters manufactured every month in Mexico almost all is consumed. A small percentage of alcohol only is used in the manufacture of varnishes, perfumes, for certain household purposes, such as heating and cleaning, for medical purposes, and for the table.

Varnishes are mostly used in the manufacture of articles of luxury. Perfumes are luxuries. The other purposes for which alcohol is used are few in number and not very important. Medical applications of alcohol, excepting its use as a disinfectant, are constantly being restricted instead of developed. Many examples of this could easily be given.

To multiply many times all taxes and duties on alcohol, to make it extremely costly—such is the remedy that I consider efficient to combat the plague that fills the hospitals and cemeteries of Mexico even faster than Asiatic cholera; and fills the jails more rapidly than hereditary influences. It is not enough to increase the tax a few cents on a barrel of wine or brandy or pulque, it is necessary to get to the very heart of the industry and commerce of alcoholic drinks and bleed it to impotency. There are, however, two objections that I must anticipate. First, such a course involves the ruin and complete bankruptcy of great numbers of manufacturers and merchants. Such an objection is weak, on the ground that the progress of humanity everywhere exacts the sacrifice of industries and of commerce in articles that become obsolete. We cannot, for example, demand that the typewriter be suppressed in order that the penman may not be ruined; nor can we demand that the railroads be stopped in order to avoid the ruin of the owner of stage-coaches. Industries and commerce are being continually transformed, and capital that was formerly employed in one way is now employed in another. Of course, there are always victims of the progress of civilization, but the wealth, life, and honor of the larger number in any society should be first considered. Then, too, such evils in connection with the business of manufacturing and selling alcohol may be very much diminished by graduating the duties and taxes in such a way that they may be gradually but constantly increased in order to attain the proposed end. The second objection has reference to the diminution of the revenues of the State, following a great rise in the taxes and a fall in production. Such a contingency is not to be feared, because the possibility of gradation would prevent it.

If the use of alcohol as a beverage were done away with, the average duration of life would be much higher, industries would be multiplied, commerce quickened, agriculture benefited, and, in time, all human energy would be increased.

Laboratory Section

THE INFLUENCE OF STORAGE AND VARIOUS PRESERVATIVES UPON THE DISSOLVED OXYGEN IN WATERS.*

By ARTHUR LEDERER, M. D.,
Chemist and Bacteriologist, Sanitary District of Chicago.

The determination of dissolved oxygen in waters is constantly receiving more recognition as an extremely valuable aid in the differentiation of the quality of a water or sewage effluent; but probably more than with any other constituent of the water or effluent, one must be extremely cautious in formulating a definite opinion. In judging a water or filter effluent, we have to weigh carefully not only all the analytical factors which indicate the composition at the time of the examination, but we must go further, and decide, if possible, how the composition may be changed during storage, and what the effect of such a water or effluent would be upon an unpolluted water. The determination of the dissolved oxygen will furnish the key to the solution of this question. One may determine the dissolved oxygen in two different samples, both apparently clear and inviting. The dissolved oxygen content may be, to state an example, about nine or ten parts per million, yet it would be a great mistake to conclude that the waters will be nearly alike in their sanitary quality or in their influence upon a fresh water and fish life. One water may be the effluent of a sprinkling filter, highly putrescible, with from twenty to eighty thousand bacteria in one cubic centimeter, the great majority of them acid formers; the other may be the water of Lake Michigan during the summer period, non-putrescible, with a bacterial count ranging from two hundred to eight hundred per one cubic centimeter. A good water should be well aërated and comparatively high in dissolved oxygen, but the actual oxygen figure is not of so much importance as the stability of the oxygen. Of the waters mentioned above one can tell very quickly, without having ANY other information, which would be safe for discharge into a stream and which would not. Kept under perfect anaerobic conditions in a well-stoppered glass bottle at a temperature 22° C., after twenty-fours incubation one water perhaps will show an absorption of the dissolved oxygen

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

by the readily oxidizable matter of about 80 per cent.; the other an absorption of about 10 per cent. in twenty-four hours. The dissolved oxygen of the former will be almost completely exhausted in two or three days. Under the same conditions the dissolved oxygen of the latter would be far from exhausted. In other words, the former water would work serious harm in a fresh water course, because of the probable presence of pathogenic bacteria, would render in unfit for ingestion and because it would injure fish life by the ready absorption of the dissolved oxygen contents essential to its sustainment.

No hard and fast rule can be laid down which would be applicable to all cases under different conditions in the absorption of the dissolved oxygen under aërobic or anaërobic conditions. But in the case of a water or effluent of a known character and composition, the rate of absorption of the dissolved oxygen by the oxidizable matter on storage, exposed to certain constant temperatures for a definite length of time under anaërobic conditions, will form a valuble index to the quality of the water at the time of sampling. Unless the rate of absorption is fairly distinct, however, one would hesitate to draw definite conclusions in the absence of other chemical and bacterial data.

It is not the purpose of this paper to deal with the conclusions as to the sanitary condition of the water which can be drawn from the rate of absorption, but its purpose is to discuss the length of time during which a fresh water or a polluted water can be exposed at various temperatures without losing its dissolved oxygen to an appreciable extent. Conclusions as to contamination of a water, as measured by the loss of dissolved oxygen, are therefore only incidental. The study of the keeping quality of the dissolved oxygen in a water would be of value when such a determination is desirable but where no reagents are available, except the simple apparatus for obtaining a sample without aëration, and where the sampling bottle has to be shipped to a distant laboratory before a determination can be made. The method employed throughout is the method of Winkler, as recommended in the Standard Methods of Water Analysis of the American Public Health Association. The results are expressed in parts of oxygen per million by weight. Lake Michigan water, as collected from the tap of the Sanitary District laboratory, has been employed for experiments, also various effluents from the sprinkling filters of the sewage testing station, located at the same place. Care was taken to obtain all samples without aëration under the proper precautions. The idea in taking for the experiments the Lake Michigan water, on one hand, and a sprinkling filter effluent, on the other, was to get results of

* The report of Professor Letts and Dr. W. E. Adeney, on the Pollution of Estuaries and Tidal Waters, as contained in the Fifth Report of the Royal Commission on Sewage Disposal, has shed some interesting light upon this subject.

two waters extremely different in their sanitary quality, one pure and the other badly polluted. Frequent observations were made of the dissolved oxygen in the tap water of the laboratory.†

It is not always convenient, or even possible, in the determination of dissolved oxygen by the Winkler method, to add the reagents on the spot, especially where long distances have to be covered on foot. Investigations have been carried on, therefore, to find precisely to what extent the lake water and the highly contaminated water would decrease the dissolved oxygen at various temperatures in various lengths of time. A sprinkling filter effluent has been selected to represent a highly contaminated water, while the lake water probably represents the purest and most stable water and is used for comparison. The tests have been carried on by filling a large bottle with the water to be examined under the necessary precautions to avoid aëration. From the big bottle a set of small eight-ounce glass-stoppered bottles were filled immediately under the same precautions. Thus a uniform set of samples was obtained, which would not have been possible if the samples had been taken successively from the lake or sprinkling filter direct. Tap water has been used where lake water was called for. The bottles were then exposed in two refrigerators, one at at a temperature of 22° C., another at 10° C., and examined at certain intervals. To prevent leakage of air into the bottles, vaseline or melted paraffine was put around the stoppers, and a piece of rubber cloth was fastened tightly over the stopper to press it down firmly. The bottles were stored in a dark place, so the important influence of sunlight does not enter into the results of the experiments. Ordinarily, of course, a sample collected in the field for the determination of dissolved oxygen would be put in a dark receptacle. Ice, however, will not always be available, and therefore investigations have been carried on with the high temperature of 22° C. A set of lake water samples were collected under the proper precautions, one half of which were stored in refrigerators at 22° C., the other half at 10° C. One typical result may suffice:—Starting with a dissolved oxygen content of 9.5 p. p. m., it has been found that the reduction of dissolved oxygen after one day amounted to 6.5 per cent. during warm storage, and to only 2.1 per cent. during cold storage. After three days warm storage gave 17.1 per cent., and cold storage 10.6 per cent. reduction. After five days, the warm storage reduction amounted to 21.3 per cent., cold storage reduction to only 11.6 per cent., and so forth.

†The water is pumped from the 68th Street and 12th Street cribs. During the cool months of April and May of this year (1910) twenty-three observations were made; the average temperature of the water was 9.9° C., the average content of dissolved oxygen 12.6 p. p. m. During the hot period of June, July, and August, fourteen observations were made, most of them during the month of July. The average temperature of the water was 21° C., the average content of dissolved oxygen 9.2 p. p. m. The dissolved oxygen of the tap water decreases strikingly as the warm season progresses and the temperature of the water rises.

It is evident from a comparison of the warm and cold storage results that the percentage reduction of dissolved oxygen at 22° C. is quite distinct. The influence of cold storage in preventing a change in the amount of dissolved oxygen is so decided as to leave no doubt as to the advisability of of keeping the sample in a cool place when the reagents for the determination of the dissolved oxygen are not at hand. While, in the cold storage of pure water samples, a few hours may not cause a material change in the final result, it is altogether a different matter where one has to deal with a highly contaminated water. Even cold storage will then show somewhat conspicuous reductions in a short period. The difference in the effect of cold storage and warm storage on the same set of sprinkling filter effluents is shown in the following result:—The parallel set of samples was again exposed to the two different temperatures, starting with a dissolved oxygen contents of 4.7 p. p. m. We find a reduction of 23.5 per cent. after twenty-four hours cold storage and a corresponding reduction of 50.0 per cent. during warm storage. After three days, the reduction was 49.0 per cent. for the cold and 74.0 per cent. for the warm temperature, and so on. A large number of other tests have given similar results. Here again the low temperature retards decidedly the loss of dissolved oxygen.

In crude sewage, the results are still more striking. During the cold season the sewage of the 39th street outfall sewer in Chicago is fresh, and contains a small amount of dissolved oxygen, usually about one to four parts per million. During storage the dissolved oxygen is rapidly absorbed by the putrescible matter. A set of crude sewage samples exposed to a temperature of 10° C. lost practically the entire amount of dissolved oxygen, 3.1 p. p. m., within four hours. In another case the dissolved oxygen starting with 1.0 p. p. m., became completely absorbed during the first hour. These figures, by themselves, are not of great value on account of the different stabilities of various samples. They are, however, in line with what these tests have shown so far, that is, that the very putrescible sample will lose its oxygen very quickly.

The determination of the dissolved oxygen in all samples was carried on by the Winkler method. The sprinkling filter effluent which was selected for the various tests has run putrescible for the greater part of the time, and has shown a bacterial count of 5,000 to 30,000, of which more than half were acid formers.

Since the dissolved oxygen disappears very quickly, especially in putrescible waters, it seems evident that where a determination of the dissolved oxygen is not carried out on the spot, the sample cannot be kept any length of time, even on ice, without losing its oxygen. Thus the question arose whether the addition of a preservative to sample bottles

would not prevent or at least retard the loss of dissolved oxygen. A number of preservatives were tried, such as chloroform, thymol, alcohol, tricresol, phenol, and formaldehyde. Mercuric salts could not be used because of the reaction taking place on adding the reagents employed in the Winkler method; it may be valuable to try them in connection with another method. The use of chloroform was likewise unsatisfactory, as it quickly takes up the iodine which is liberated by the addition of sulphuric acid previous to the final titration with sodium-thiosulphate. The iodine taken up by the chloroform is not easily reduced by the sodium thiosulphate solution, and a complete reaction requires a good deal of agitation; this must be avoided, as it causes the absorption of more atmospheric oxygen.

Tricresol has been tried in amounts of 0.5 cc. to each eight-ounce bottle. The samples were first collected under the proper precautions and the tricresol added just before replacing the stopper. A blank series was always run in connection with each experiment in order to judge the effect of the preservative. A sprinkling filter effluent was used in all these experiments in preference to the lake water, for the reason that the percentage reduction in a limited time is greater, and thus the effect of the antiseptic could be better noted. In the final calculation of the parts per million of dissolved oxygen, correction had to be made for the amount of antiseptic added. In determining the dissolved oxygen in the tricresol series, a decided drop was noted in the first sample, and since it took only about ten minutes from the time of filling the bottle to the first titration, it seemed clear that the sudden decrease must have been due to easily oxidizable organic matter present in the tricresol. A lake water sample, for instance, which originally showed 12.0 p. p. m. of dissolved oxygen, gave, on addition of .5 cc. of tricresol, only 6.3 p. p. m. after 45 minutes, representing a drop of 47. 5 per cent. In another case a lake water with 9.4 p. p. m. dropped to 6.6 p. p. m. on fifteen minutes contact with tricresol, amounting to a reduction of 29.8 per cent. It was noted, however, that the dissolved oxygen remained stable after the initial drop, in some cases for two days and longer.

Liquefied phenol (90%), 1 cc. added to each bottle, gave a similar result. The figures dropped quickly but remained constant afterwards for fully three days, the full length of the experiment. One lake water experiment showed a reduction of 35 per cent. in forty-five minutes, another a reduction of 39.3 per cent. in fifteen minutes.

Thymol, added as a crystal of about 0.3 gram in weight to each bottle, has shown no retarding effect whatever, the dissolved oxygen disappearing almost completely in forty-eight hours in the thymol series, as well as in the blank.

Alcohol (90%), added in amounts of 2 cc. to each bottle, had no effect. The alcohol set was somewhat more quickly exhausted than the blank set.

Formaldehyde (40%), added in amounts of 1 cc. or 2 cc. to each bottle, has given very satisfactory results. The first experiments were carried on with 2 cc. of formaldehyde of 22° C. storage. The effect upon the dissolved oxygen figure was immediately apparent. In one instance the reduction of the dissolved oxygen figure during warm storage amounted to 76.3 per cent. in the blank sample after twenty-four hours, while the formaldehyde sample remained unchanged. After two days the formaldehyde sample showed a loss of only 3.5 per cent. A very large number of other tests on sets of samples containing 1 or 2 cc. of formaldehyde gave similar results.

Some of the 1 cc. experiments showed a better result than the 2 cc. experiments; this may be accidental however. A number of other experiments not noted here have proved that either 1 cc. or 2 cc. will do the work. The 10° C. storage experiments gave a still better result. As in the previous tests, a sprinkling filter effluent has been employed throughout. In one typical case the blank set gave a reduction of 13.2 per cent. of dissolved oxygen after one day, 26.3 per cent. after two days, 55.8 per cent. after three days, and 77.1 per cent. after four days, while the set preserved with formaldehyde gave a reduction of only 1.7 per cent. after four days, and even this very small reduction may be due to an unavoidable working error. In some other experiments no reduction of the dissolved oxygen in the formaldehyde set has taken place even after five days. It was not considered necessary to prolong the experiment over four days, as it is assumed that this is as long as it would ordinarily be necessary to keep a preserved sample prior to the determination.

Investigations have also been carries on in connection with formaldehyde with a view to determine the influence of bright daylight upon the reduction of dissolved oxygen. A perceptible reduction resulted during the first twenty-four hours, although it could not compare with the decided drop of the dissolved oxygen in the blank experiment. In one case the reduction on the fourth day amounted to 20.4 per cent. in the formaldehyde sample. Nothwithstanding the fact that the influence upon the dissolved oxygen in these experiments is remarkable, it is evident that where samples have to be kept for subsequent determination they should be kept in dark places. A large number of experiments have been carried on to corroborate the results obtained in this paper.

From these investigations the following conclusions can be drawn:

First. The percentage reduction of dissolved oxygen in waters which are stored in tightly closed bottles and exposed to a constant temperature for a definite length of time, constitute a fair index of pollution.

Second. To unpreserved samples of polluted waters, the reagents for the determination of the dissolved oxygen must be added on the spot to avoid a reduction. In a pure water, such as that of Lake Michigan, if stored at a low temperature the samples can be kept for a few hours without material reduction.

Third. The addition of 1 cc. of 40 per cent. formaldehyde solution to a sample of water, even if badly polluted, will preserve the amount of dissolved oxygen present for at least two days at 22° C. storage, and for at least four days at 10° C. storage.

Fourth. If kept in a dark place, a sample of water taken under the necessary precautions to avoid aëration, can be preserved with formaldehyde for a reasonable length of time and shipped to the laboratory without danger. Thus no field apparatus, except the device for taking the sample and a bottle of formaldehyde, is required. In calculating the final result, a correction must be made for the amount of sample displaced by the addition of the preservative.

Section of Municipal Health Officers

DIPHTHERIA AND ITS PROPHYLAXIS.*

By JULIO F. ARTEAGA, M. D.,
Havana, Cuba.

The Cuban health authorities have kept up, if not improved, the excellent sanitary condition of the island which was bequeathed to them by the American Provisional Government. They are proud of their yellow fever and smallpox records, and not only succeed in keeping out these scourges from Cuba but also endeavor to get rid of other diseases like diphtheria. In order to do this, all known prophylactic measures are resorted to. The prophylaxis of diphtheria, particularly, is a matter that deserves more attention than that usually given to it by boards of health.

Although it is now admitted that this dreaded disease does not cause the fearful ravages of former days, previous to O'Dwyer's intubation and Behring's discovery of the antitoxin, yet vital statistics show a considerable death rate. Not only is the death rate from diphtheria too high, but the morbidity as well. Both should be reduced.

As to local conditions in Havana with reference to diphtheria, it is apparent from the table what the morbidity and mortality rates amount to:

* Read before the Section of Municipal Health Officers of the American Public Health Association, Milwaukee, September, 1910.

DIPHTHERIA.

Months	1905 Reported		1906 Reported		1907 Reported		1908 Reported		1909 Reported		1910 Reported		Total		%
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Mortality
Jan.	25	4	30	4	95	9	66	4	47	1	53	6	316	28	.0886
Feb.	23	3	30	2	94	4	54	3	55	3	41	1	297	16	.0539
Mar.	27	0	30	1	73	8	50	3	55	2	43	2	278	16	.0576
April	15	3	56	5	120	8	39	1	43	1	34	6	307	24	.0782
May	9	2	39	2	60	4	31	2	30	2	52	9	221	21	.0995
June	23	5	20	1	45	4	23	4	24	4	18	0	153	18	.1176
July	19	0	75	0	42	7	29	2	24	2	......	...	189	11	.0582
Aug.	14	0	34	1	35	3	22	2	35	4	......	...	140	8	.0571
Sept.	10	2	39	4	24	2	25	0	48	2	......	...	146	12	.0821
Oct.	19	1	39	5	42	1	29	2	45	2	......	...	174	11	.0632
Nov.	18	0	51	3	59	3	39	1	45	5	......	...	212	12	.0566
Dec.	28	2	79	10	41	1	34	2	50	4	......	...	232	19	.0819
Total.	230	22	522	38	730	54	441	26	501	32	241	24	2665	196	.0735
% Mortality	.0957		.0728		.0740		.0590		.0639		.0996				

It is a striking fact that the mortality rate from 1905 to 1909, inclusive, has decreased from 9.57 per cent. to 6.39 per cent.,—very low figures for diphtheria. In the spring of 1910 there was a rather extended epidemic in Havana and for that reason the mortality for the first six months rose to 9.96 per cent.

I consider the preceding figures proof of the therapeutic value of antitoxic serum, inasmuch as all Cuban physicians resort to it, convinced of its specificity. The total number of cases reported from January 1, 1905, to June 30, 1910, amounted to 2665,* with a total of 196 deaths, giving a mortality of 7.35 per cent.

It is evident that the winter months cause an increase in the morbidity, but the mortality reaches its maximum during the month of June. The only explanation for this fact is that physicians, during the summer months, are not on the lookout for diphtheria and are more likely to see cases of "summer complaint" instead. This leads to late diagnosis and untimely treatment.

It is thus clearly shown that diphtheria in Havana is an endemic disease, which at times assumes an epidemic form similar to that in other large cities.

*At the National Laboratory in Havana, during the same period, there were examined 1915 positive diphtheria exudates. It is fair to suppose that the 2665 cases reported at the Sanitary Department were all true diphtheria, because other laboratories, besides the official one, also examined diphtheria exudates.

In the performance of my official duties in connection with the epidemic of this year (1910), it occurred to me to try a prophylactic measure, and I started to use it in a small way. Merely as a suggestion I am placing this method before the American Public Health Association, for its consideration.

Whenever I was called to see a case of diphtheria, pending the laboratory finding on the exudate, I at once injected from 500 to 1,000 units of antitoxic serum, taking into account the age and condition of the patient, date of sickness, and similar facts. At the same time I inquired of every person living in the same house as to their immunity from diphtheria, and in all negative or doubtful instances, I inject a prophylactic dose of the serum. On the few occasions that I followed this above method, I was rewarded by the recovery of the patients and the non-appearance of the disease in the other members of the household.

My suggestion, briefly stated, is as follows:—That boards of health in dealing with cases of diphtheria, whether sporadic, endemic, or epidemic, should make the injection of a small dose of antitoxin compulsory for all the non-immunes of the neighborhood, particularly those residing in the same houses where the cases have appeared. It seems to me that this precaution would be an efficient means of checking and possibly of eradicating diphtheria in any community.

Of course, the board of health officials must supervise such prophylactic treatment, so as to be on the lookout for anaphylactic manifestations and thus be able to counteract any untoward symptoms, especially nodular enlargements, pain, rashes, fever, and collapse, which are liable to appear from the fifth to the twentieth day after the injection.

The immunity conferred by these prophylactic injections has been estimated, by Sittler and others, to last from three to five weeks, provided the people so treated do not expose themselves too often.

There will be objections to this compulsory measure similar to those sometimes urged against vaccination against smallpox, and quinine prophylaxis against malaria; but the objections will be as groundless in the case of diphtheria as in the diseases mentioned.

Public health requires vaccination, and the quinine treatment as preventives for two great evils. Diphtheria is no less an evil than smallpox or malaria.

Notes and Reviews*

EPIDEMIOLOGY AND PREVENTIVE THERAPEUTICS.

By H. W. HILL, M. D., D. P. H.,
(*Reviewer.*)

Epidemiological Advance in Twenty Years. In struggling with everyday problems, and when discouraged by slow progress and the mountainous obstacles of prejudice, ignorance and illogical procedures encountered in public health work, a review of conditions twenty years ago makes the reader feel that "the world do move" after all; and heartens him for another onslaught.

Parkes Hygiene, the eighth edition of 1891, is on these grounds worth reviewing here. This was a standard work in its day. From this edition of 1891 we learn:

"*Dampness of soil*† may presumably affect health in two ways; 1st, the effect of the water *per se* * * * 2nd, *by aiding the evolution of organic emanations*."

"A *moist soil* influences greatly the development of the agent, whatever it may be, which causes the paroxysmal fevers." (Malaria, typhoid fever, and cholera are then connected by the author with the rise and fall of ground waters, who then adds, "It is not the ground water itself that is the cause of the disease, but the *impurities in the soil* which the varying level of the ground water helps to set in action.")

"Brushwood is frequently bad and should often be removed * * (but) its removal will sometimes, on *account of the disturbance of the ground*, increase malarious disease for the time."

"Epidemic diarrhea has * * been considered to depend largely on *soil temperature*." (Cholera was also correlated with variations in *soil temperature at a depth of six feet.*)

"Impure soils" affect the incidence of cholera and typhoid.

"Doubts have been expressed whether (malaria) is produced by telluric effluvia or by substances passing from the soil into the drinking water. *The evidence, however, appears conclusive in favor of both of these modes of entrance into the body*."

"Enteric fever (typhoid) *undoubtedly spreads also* through the *air* * * (He also refers to the spread of typhoid by water and milk.)

"Statistical enquiries on mortality prove *beyond a doubt* that of the causes of death which are usually in action, *impurity of the air is the most important*."

(A noted health officer emphatically expressed this view at a recent public health convention, but a year later retracted it in full.)

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

† The italics are ours.

"The poison of yellow fever * * * may also exist in *sewer air*. Smallpox, scarlet fever * * * are no doubt *aggravated by it* (sewer air). That dysentery and diarrhea may also be caused by exhalations proceeding from a *foul sewer* we cannot doubt. Diphtheria and acute follicular tonsilitis are also associated with *sewer air*."

"It also appears likely that the remarkable cessation of spotted typhus among the civilized and cleanly nations is in part owing, not *merely to better ventilation*, but to more *frequent and thorough washing* of clothes."

Concerning scarlet fever: "Nothing definite is known with regard to prevention, except that a *good sanitary condition* seems to lessen it, and probably its spread."

Concerning malta fever: "Preventive measures would appear to be attention to *sanitary conditions* generally * * * ."

"The origin of this disease (plague) is closely connected with *defective sanitation*, such as overcrowding, defective disposal of fecal matters, bad ventilation, and the like; and privations. Poverty and dirt are two main factors in its causation. * * "It has now been banished (from Cairo) for many years simply *by improving the ventilation of the city*."

In various chapters, yellow fever is alleged to be due to impure water and to sewer air, also that "it is coming out more and more clearly that yellow fever, like cholera and typhoid, is a fecal disease;" also "the two agencies of yellow fever and (malaria) are entirely distinct."

Doubts are expressed as to the relation of the cholera vibrio and the typhoid bacillus to their respective diseases. Erysipelas is traced to atmospheric impurity. Tuberculosis is hereditary and the dried sputum in dust is also a cause of spread. Diphtheria, scarlet fever and ulcerated throats are related to impure water. The desquamations of scarlet fever convey the disease.

Seven pages are devoted to descriptions and discussions of plumbing fixtures, evidently looked upon as important safeguards against disease; thirty-eight pages to ventilation, (not an undue proportion if impure air be the most important cause of death in the world.) One hundred and twenty-four pages are given to examination of foods, chemical, microscopical, etc; thirty-eight to meteorology; seven to vital statistics; thirty-three to the prevention of disease! Medical school supervision is not mentioned.

Space will not permit further demonstration that the obvious trend of the day was the search for the sources of disease in the environment. Hence the search necessarily failed, since it systematically overlooked the infected person himself as that source, although here and there it is tentatively suggested that the discharges of the patient may have something to do with the spread of infectious diseases.

The omissions are even more significant. Diphtheria cultures are mentioned as a tentative proposal by Roux and Yersin; the Widal reaction was unknown as a practical public health measure; testing of sputum for

tubercle bacilli is not referred to; the chemical examination of water is referred to in many places, and is outlined, but the systematic bacterial examination of water (infinitely more valuable) is described as in a most embryonic condition. Tuberculosis, mallein, antitoxin, typhoid inoculation are, of course, not touched upon. The carrying of typhoid fever by convalescents is attributed to "unwashed clothing"! (Judge Bulger, of New York, according to press notices, recently preferred charges against Dr. Doty, on the ground that cholera is so carried!) Flies and contact, mouth spray and hand infection are usually unrecognized. To us, now, such a book is the play of "Hamlet" with Hamlet left out.

When we compare the blind stumblings of the hygienists of what is after all a recent date, with the established facts of today, we can find hope for the future in our present relatively enormously advanced situation.

Concerning environment versus infected discharges, the telescope has been reversed, and we place our eyes for the former at the large end, for the latter at the small. Plumbing, air, soils, foods (except when contaminated by discharges) garbage (except as a fly breeder), sewer gas, stagnant water, clay soils, the daily temperature fluctuations of the soil at depths of four and six feet, are fortunately no longer matters of concern to us.

Our misfortune is that the public, a part of the medical profession, and even some health officers, still hold one or more, sometimes many, of the discarded views of 1891. The chief immediate duty of epidemiology is the instilling of correct views into these different classes.

SANITARY ENGINEERING NOTES.

By ROBERT SPURR WESTON,
Boston, Mass.
(*Reviewer.*)

Action of Seltzer water on lead, tin and antimony, and causes of intoxication by chemical alteration.* The author has made a study of the action of carbonated water upon the various metals used for stopping the siphons. The metals used are either pure tin or an alloy of tin with lead or antimony. The alloys are affected much more readily than pure metals. French police regulations limit the proportion of lead to ten per cent. The author finds, however, that there is little difference in the amount dissolved after six months action, between alloys containing only 0.5 per cent. and those containing forty per cent. of lead. The solution of antimony in carbonated waters is also assisted by electrolytic action. The author recommends that only glass should come in contact with carbonated waters, and that if metal has to be used, it should be covered with some impervious cement or varnish. The author believes that much smaller amounts of lead than those usually considered harmless will cause serious bodily derangement after long continued use.

R. S. W.

Great Lakes International Pure Water Association. With the authority of the Health and Sanitation Section of the International Municipal Congress and Exposition, which was held in Chicago the latter part of September, Dr. C. E. Ford, Superintendent and Secretary of the Board of Health of Cleveland, called a meeting of health officers to consider problems relating to a pure water supply for the cities bordering on the Great Lakes. As a result of this call about forty representatives of the states, provinces, and cities bordering on the Great Lakes met and formed the Great Lakes International Pure Water Association.

The membership will include representatives of the United States and Canada, of eight states and two provinces bordering on the Great Lakes and the St. Lawrence River, and of municipalities in the Great Lakes basin. Representatives of the United States Public Marine-Hospital and Health Service, The United States War Department, The Canadian Public Health Service and the Canadian War Department, will also be included among the members.

*A. Barille. Comp. Rend., 153, 351–3.

Temporary officers, pending permanent organization, were elected as follows:

President, Dr. C. E. Ford, Secretary State Board of Health, Cleveland, Ohio.

Vice-President, Dr. Charles J. Hastings, Medical Health Officer, Toronto, Ontario.

Secretary-Treasurer, Dr. Edward Bartow, Director Illinois State Water Survey, Urbana, Illinois.

Editor, Dr. W. A. Evans, Chicago, Illinois.

Executive Committee, the officers and Dr. Roger G. Perkins, Cleveland, Ohio.

A tentative scheme for organization was adopted, the details being left to the Executive Committee.

The general topics discussed at the meeting were:

The need of a uniform policy in the location of water intakes; the disposal of sewage; the prevention of discharge of ship sewage; the study and control of typhoid fever.

E. Bartow.

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Accessory Substances in Alcoholic Drinks. The impression very generally prevails among physicians and laymen that alcoholic beverages have quite individual properties and that their power to intoxicate is not strictly proportional to their content of ethyl alcohol. Such variations in toxicity must be due to the higher alcohols, to aldehydes, esters, and acids, very numerous accessory bodies difficult to tabulate and impossible to estimate accurately by quantitative analysis. In crediting these ingredients with marked powers scientific opinion is more guarded than popular belief. Dr. Abel has pointed out that, after all, in human experience there is a fair correspondence between the quantity of ethyl alcohol taken and the degree of intoxication produced in a given subject. He is careful not to make his statement too uncompromising.*

It is commonly held that cheap alcoholic products are much more deleterious than those which are choice and costly. This is constantly claimed to be the case with the non-descript illicit liquors dispensed in no-license communities. There must be some foundation for such a fixed opinion. But there is no doubt that much of the reasoning in this connection is fallacious. Persons using the dubious beverages are observed to become grossly drunk and are charitably assumed to be suffering from the exceptionally "vile" and "poisonous" preparations which they have been consuming. It is highly probable that the same individuals would be found equally abject if they had been treated as freely with the rarest and most expensive drink. The fact usually ignored seems to be that the high-grade liquors are used by men of good taste and, as a rule, by men of self-control. The inferior article is accepted by a very much less reliable class of devotees. There is no doubt, however, that some forms of alcoholic liquors are much superior to others when, in sickness, it is necessary to consider an irritable stomach.

Two articles have come to hand which embody the results of many experiments designed to test the influence of the secondary constituents upon the toxicity of various beverages. The first of these, by D. D. Whitney, of Wesleyan,† reports results obtained with rotifers as the organisms subjected to trial. This seems rather remote from our interest in human susceptibilities, but after all it is probable that protoplasm in

*Science, 1911, XXXIII, p. 725.
†Science, 1911, XXXIII, p. 587.

all forms of animal life has some reactions in common. Dr. Whitney's results are very striking when regarded from the standpoint of pure science; how far they can be applied to hygiene is questionable. He finds that pure ethyl alcohol when reduced with distilled water to a concentration of ten per cent. requires nearly an hour to kill the organism. Distilled liquors (brandy, whiskey, and gin) are somewhat more poisonous when they are diluted to the same alcoholic strength. Malt liquors kill when the alcohol is but two per cent—a concentration which actually permits reproduction when there are no minor substances present. Diluted wines are fatal when the mixtures contain one per cent. or thereabouts. Cider proves to be the worst possible medium, killing the rotifers when attenuated to 0.4 per cent. alcoholic strength. One is reminded of the opinion so commonly heard in the country, that drunkenness produced by cider is of a particularly profound and vicious type.

The second paper is one by Dr. Julius Friedenwald, of Baltimore, presented before the Association of American Physicians in session at Atlantic City.‡ In the work reported here the test-animals have been rabbits and the administration of the mixtures has been by slow intravenous injection. It was found that such injections could be conducted without producing coagulation of the blood even when the fluid contained as much as thirty-eight per cent. of ethyl alcohol. So far as comparable solutions were used by Friedenwald and by Whitney there is a fair correspondence between their results. With rabbits as with rotifers, pure alcohol, when sufficiently diluted, is borne better than any liquor. Wines are again found to be more toxic than distilled liquors reduced to an equal content of alcohol. Red wines, with their more extensive inclusion of organic substances from the grape, are more toxic than white. It is interesting to find that both authors fix upon claret as an exceptionally harmful mixture. Perhaps the tartaric acid has something to answer for. Just in this connection it is desirable to point out that the method of intravenous injection may give very different results from those that follow the taking of a mixture into the alimentary tract. The alcohol is absorbed unchanged and its full effects may be realized almost as surely as though it had been thrown directly into the blood stream. It is by no means so certain that the minor constituents will be received freely into the circulation. The intestinal wall is a strong line of defense for the body. The liver intercepts and neutralizes many toxic substances. Tartrates, we know, are practically denied entrance into the lymph and blood. We must therefore make due allowance for Dr. Friedenwald's method when we are tempted to apply his results to human life. Our judgment as to which alcoholic beverages are more wholesome—or less injurious—will continue to be based chiefly upon the observations of clinicians and social workers.

‡Boston Medical and Surgical Journal, 1911, CLXV, p. 60.

DATA FROM WATER PURIFICATION WORKS—June, 1911.

CITY	Population	Source of Supply	Method of Purification	Average daily Consumption (Million Gallons)	Washwater (per cent.)	Sedimentation Basins. Settling Basin: Period in Hours	Settling Basin Effluent: Turbidity	Settling Basin Effluent: Bacteria per c. c.	Coagulation Basin: Period in Hours	Coagulation Basin Effluent: Turbidity	Coagulation Basin Effluent: Bacteria per c. c.	Parts per 1,000,000 Unpurified Water: Turbidity	Unpurified Water: Color	Unpurified Water: Total Hardness	Purified Water: Turbidity	Purified Water: Color	Purified Water: Total Hardness	Nos. of Bacteria per Cu. Centimeter: Unpurified Water	Nos. of Bacteria per Cu. Centimeter: Purified Water	No. of Deaths from: All Causes	No. of Deaths from: Typhoid Fever	No. of Deaths from: Pulmonary Consumption
Albany, N. Y.	100,700	Hudson River.	16 rapid sand, 8 slow sand Filters and Disinfection.	20.1	2.3	18.	8	5,500	Combined with the sedimentation.			13	30	68	0	20	68	9,500	5	166	1	21
Cincinnati, O.	364,463	Ohio River	Rapid sand filters using lime and iron as a coagulant.	50.5	4.2	48.	24	202	10	8	55	76	...	113	0	...	122	1,300	25	545	4	99
Columbus, O.	181,548	Scioto River	Water softening and mechanical filtration.	16.2	1.1	18.	1.5	9	Combined with the sedimentation.			19	19	298	0	5	85	800	6	163	0	20
Harrisburgh, Pa.	70,000	Susquehanna R.	Mechanical Filtration.	8.5	3.1	6.	...	...	1.5	...	88	23	7	51	0	0	53	1,246	33	75	(?) 1	10
McKeesport, Pa.	42,694	Youghiogheny R	Water softening and mechanical filtration.	4.3	0 5	20.	...	16	Combined with the sedimentation.			...	...	103	0	0	59	5,100	4	...	...	...
New Orleans, La.	373,000	Mississippi River	Rapid sand filters using lime and iron as a coagulant.	16.6	0.6	4.	220	650	12	33	400	260	11	106	0	4	59	650	95	633	16	70
Toledo, O.	170,000	Maumee River	Mechanical filtration.	17.4	1.7	7.	4	400	Combined with the sedimentation.			82	43	...	0	12	...	2,432	91	207	0	...
Washington, D.C.	348,560	Potomac River	Sedimentation with Coagulation and slow sand filters.	62.2	0 5	96.	18	83	Combined with the sedimentation.			81	0	106	0	0	89	4,600	9	437	2	58
Youngstown, O.	80,000	Mahoning River	Mechanical Filtration.	9.1	4.0	3.	20	28,000	..	..	..	30	22	206	0	0	207	218,000	2,600	73	0	11

Mortality statistics given for Cincinnati include deaths for weeks ending June 3, 10, 17, 24, and July 1st, 1911.
High numbers of bacteria found in the filtered water at New Orleans were due to growths of Algae in the filters during part of the month. The Mortality statistics for New Orleans during June include "NON Residents."
All of the filters at Toledo were run at 30% overload during the month.

PUBLIC HEALTH NEWS AND NOTES.

By B. L. ARMS, M. D., Boston.
(*Reviewer.*)

New Health Laws in Wisconsin. *Among the laws passed by the last legislature of Wisconsin were several relating to health matters. One provides that the reports of all cases of tuberculosis shall be treated as confidential. The law relating to the licensing of embalmers was amended so as to require each candidate to practice two years under a licensed embalmer before he can be granted a license. By another law the State Laboratory of Hygiene is designated as the official laboratory for all bacteriological examinations which will assist in making a proper diagnosis of disease. All physicians practicing in Wisconsin are now to report all cases of poisoning from lead, phosphorus, arsenic, mercury, or compressed air illness as the result of the patients' employment. Another new law relates to the registration of nurses and provides for a committee of examiners. The display of fruits, vegetables or other food products on the sidewalk or outside a place of business is prohibited unless the goods are securely covered by glass, wood or metal so as to be properly protected from flies, dust, dirt or other injurious substances. The State Board of Health is authorized to provide biennially for a State Conference of Health Officers. All towels in hotels or public buildings must be individual towels.

Personals. Dr. Francis H. Slack has been appointed Secretary to the Boston Board of Health.

Mr. William Paul Gerhard, of New York City, a member of the American Public Health Association, has recently received the degree of Doctor of Engineering *honaris causa* from the Technical University of Darmstadt.

The Resignation of Dr. Probst. The following editorial from the Ohio State Medical Journal, September, 1911, published verbatim, speaks for itself, and all the more strongly in that the office of publication is at the State Capital:

"In the January number of THE JOURNAL we took occasion to protest against the action of the State Board of Health in dismissing summarily so many employes without any reason other than in the alleged cause of economy. We expressed the fear that the policy thus inaugurated would demoralize the remaining staff and closed with the remark that 'having registered our protest we could only watch the outcome with interest and await developments.' The anticipated 'developments' have occurred. Several members of the staff resigned as soon as they were able to secure more stable positions elsewhere; others have sought to do so, we have

* Wisconsin State Board of Health Bulletin, April–June, 1911.

been informed, and to cap the climax, Dr. C. O. Probst, who has given twenty-five years of efficient service to the state in developing the work of the State Board of Health from its inauguration to its recent high position among the states, achieving a national reputation as an expert sanitarian, has been forced to resign. We say *forced*, because we can see no other construction to be placed upon the chain of incidents following one after another with the sequence of a well planned campaign. First, as already chronicled, in last December without consulting the Secretary, eleven of his staff were summarily dismissed. Then, shortly thereafter, the executive committee, if not officially at least as individuals, sought an opinion from the Attorney-General as to whether or not the office of Secretary was an elective one. Mr. Hogan replied that it was not elective and the only way to get rid of the present incumbent would be to file charges against him. This route being unavailable for obvious reasons, a simpler and more effective plan was pursued. The Board, in spite of the opinion of the Attorney-General and contrary to all precedent, in June last elected Dr. Probst as secretary for one year, beginning October 1, 1911. Having been already hampered in carrying out his policies, and with such a very uncertain tenure of office in prospect, the inevitable result in the shape of his resignation promptly followed.

"The storm of protests which followed shows the public estimate of this latest blow to our health service, and the widespread suspicion of ulterior motives. The charge has been openly made in the daily press that it was a purely political move; if so, and if the medical members of the board were a party to it, it is a dishonor to our whole profession. Anyone making the health service of our state dependent upon the spoils of politics, merits the severest condemnation. If this action was not due to the evil influence of politics, it reflects strongly, in our opinion, upon the judgment of the board, to say the least. How can high class men be secured on a prospect of one year's term of office? This baneful effect of the uncertainty of tenure of office in state positions has been demonstrated a thousand times!

"This is the acknowledged day of specialists, and public hygiene and sanitary science form a recognized specialty. Such a specialist should have charge of the health service of our state, and, if honest and efficient, should not be hampered in the carrying out of his policies or fettered by the fear of not being re-elected by a board made up of members not one of whom confines his professional occupation along health lines.

"If a reorganization of our health service was so necessary, let us have a complete one which will do away with the present plan altogether. Let us get abreast of the times, and have a *Health Commission*, as in many other States, made up of men specially trained for their duties and devoting their entire time to the service of the state. Here is a good field for work for the State Association in the next Legislature, and now is an excellent time to prepare the way."

Pellagra. There will be a clinic at the State Hospital for the Insane at Columbia, S. C. on the subject of Pellagra, Thursday, November 2nd at 2 p. m., at which many interesting papers will be read.

A cordial invitation is extended to all physicians, including those outside the state. It is believed that much valuable information can be obtained by a visit to this clinic. The clinic will be held during the meeting of the State Fair Association and low rates can be procured from the railroad.

ANNOUNCEMENTS.

Preliminary Announcement of the Thirty-ninth Annual Meeting of the American Public Health Association.

OFFICIAL CALL.

The thirty-ninth annual meeting of the American Public Health Association will be held in Havana, Cuba, from Tuesday to Saturday, inclusive, December fifth to ninth, 1911. This meeting will afford a most favorable opportunity for members of the Association and their families and friends to visit Havana and see what has been done to make it one of the most salubrious cities in the world. The season is propitious, the local committee has made every arrangement for the convenience, comfort, and pleasure of visitors, and the Committee on Program already has under way a program that promises to be of more than usual interest. A large attendance is therefore expected, and in view of the faithful attendance of Mexican and Cuban members through a long series of years at meetings held in the United States and Canada, these countries will doubtless be well represented now that a meeting is to be held in one of the Spanish-speaking nations affiliated with the Association.

ROBERT M. SIMPSON, President.

PROGRAM.

GENERAL ASSOCIATION. The program of the meetings of the General Association will include a symposium on Asiatic cholera, a symposium on hookworm disease, and a symposium on tuberculosis, and papers on pellagra, acute anterior poliomyelitis, typhoid fever, isolation hospital construction and management, Mexican typhus, and other subjects. Committee reports of great interest will be presented.

Section programs are now in course of active preparation in the hands of the Section officers and promise to be of more than usual value.

LABORATORY SECTION. The reports of the various technical committees on standard Methods for the Analysis of Water, Milk and Sewage; and the bacteriological diagnosis of typhoid fever, etc. will be presented. It is particularly desired that papers be presented upon the examination of oysters, testing of disinfectants, and the examination of material from suspected cases of cholera and from cholera carriers. In addition to this, papers bearing on the theory and practice of bacteriology, chemistry and zoology, as applied to the advancement of sanitary science, will be gladly received.

Section on Vital Statistics. The practical value of statistics depends in a large degree upon the manner of their presentation. The Section will, therefore, consider fully the subject of "Uniform Tables for Statistical Reports and Bulletins", with the purpose of adopting standard tables for weekly, monthly, and yearly reports. This will interest municipalities as well as states, and will go far toward making mortality statistics more readily intelligible and comparable. A symposium on "Mortality Registration in the South" will be a distinct feature of the Section program. It is hoped to have in attendance a goodly number of state and municipal officers from that section of the country, who are interested in the development of registration. The southern states should before long be included in the Federal registration area. The Section on Vital Statistics can do no more important work than to assist in accomplishing this object.

Section of Municipal Health Officers. The special aim of this Section being to promote the efficient application of scientific sanitation to municipal conditions, this work of the Section is intensely practical, dealing less with abstract principles of sanitation than with the means by which these principles may be applied. The program of the Municipal Health Officers' Section keeps this fact constantly in mind. A prominent place on the program is always given to free discussion and comparison of experiences.

Sociological Section. This Section was created only last year, and in view of that fact it has been deemed inadvisable for it to formulate a program for the Havana meeting.

Section on Sanitary Engineering. The Committee having in hand the matter of organizing a Section on Sanitary Engineering will report and if a sufficiently large number of sanitary engineers are in attendance such a Section will be organized.

Members of the Association having matters that they want to bring before the Association or before any of the Sections are requested to submit them as soon as possible to the Secretary of the Association, or, if they relate to the work of any Section, then to submit them to the proper officer of the Section, as follows:

General Association—Dr. Wm. C. Woodward, Secretary, Washington, D. C.

Laboratory Section—Dr. John F. Anderson, Chairman, Committee on Program, Washington, D. C.

Vital Statistics Section—Dr. John S. Fulton, Chairman, Committee on Program, Washington, D. C.

Municipal Health Officers Section—Dr. Federico Torralbas, Chairman, Committee on Program, Havana, Cuba.

Sociological Section—Mr. John M. Glenn, Chairman, 105 East 22nd St., New York, N. Y.

Sanitary Engineering Section—Col. J. L. Ludlow, Chairman, Winston-Salem, N. C.

If no formal meetings of the Sociological and Sanitary Engineering Sections are held, places for papers intended primarily for presentation to those Sections will be found in the program of General Association or in the program of one of the other Sections.

Members intending to present papers are requested to conform strictly to the provisions of the Constitutions and By-laws with respect to their length. An abstract of such provisions will be furnished by the Secretary upon request.

COMMITTEE MEETINGS. The Committee of Seven, the Executive Committee, and the Committee on Membership will meet on Monday, December 4, 1911, at hours and places to be announced hereafter.

EXHIBIT.

The Department of Sanitation of Cuba will have an exhibit of its various methods and appliances of sanitary interest. It is hoped that Mexico and the Canal Zone may also be represented.

RAILROAD AND STEAMSHIP ROUTES.

Steamships for Havana sail from Port Tampa, Fla.; Knight's Key, Fla.; New York, N. Y., and New Orleans, La.

FROM PORT TAMPA. A boat leaves Sunday at 11:30 o'clock, p. m., arriving at Havana Tuesday at 6:30 o'clock, a. m. Another boat leaves at the same hour on Thursday and arrives Saturday morning. Reservations had best be made and tickets purchased through local railroad ticket offices

FROM KNIGHT'S KEY. Boats leave upon arrival of the train due at 10 o'clock, a. m., Sundays, Tuesdays, and Thursdays, arriving at Havana at 7:30 o'clock, a. m., the following day. This route gives the shortest possible time on the water. Reservations are best made and tickets purchased through local railroad ticket offices.

FROM NEW YORK CITY. A steamer leaves, via the Ward Line, at noon on Thursday, arriving at Havana, Monday, at six o'clock, a. m. Another leaves at the same hour on Saturday, arriving at Havana, on Wednesday morning, at six o'clock. The fare from New York to Havana, including meals and berth while at sea, varies from forty to forty-five dollars, depending upon the location of the stateroom. Passengers may secure a return ticket at a discount of ten per cent on the amount of the return fare provided the return fare is paid when the outward ticket is

procured. Reservations can be made and tickets procured at local agents of the Ward Line, at railroad ticket offices or by addressing, "Ward Line, Pier 14, East River, New York, N. Y."

From New Orleans. Details of sailing from New Orleans can be obtained at local railroad offices or by addressing Morgan Line Steamship Co., New Orleans, La.

It has been found impossible to obtain any concession in the railroad and boat rates for members attending the Havana meeting. The winter tourist rates which will be in effect at the time of the convention are, however, extremely low. Information can be best obtained by inquiring at the local ticket agency as to available routes and rates of transportation. The following rates are quoted merely to afford a basis upon which members can conveniently estimate the approximate cost.

EXCURSION FARES TO HAVANA, CUBA, AND RETURN.

From	Via Pittsburgh and Washington	Via Cincinnati and Direct Line
Chicago	$91.00	$81.00
St. Louis	——	74.00
Cincinnati	——	79.05
Cleveland	89.60	88.50
Pittsburgh	*89.60	89.60
Buffalo	92.35	92.35
Boston	96.75	——
New York	87.25	——
Philadelphia	83.00	——
Baltimore	78.50	——
Washington	76.50	——

*Not via Washington and New Orleans.

PULLMAN LOWER BERTH RATES.

	To Port Tampa	To Knights Key
New York	7.50	$9.00
Philadelphia	7.00	8.50
Baltimore	6.50	8.00
Washington	6.25	7.75
Cincinnati	6.50	8.00
St. Louis	7.25	8.75
Chicago	8.50	9.50
Cleveland	8.50	9.50
Pittsburgh	8.50	9.50

Please remember that travel to Cuba is heavier during the month of December and make reservations of sleeping car accommodations and state rooms on the boat selected as soon as possible.

The Atlantic Coast Line Railroad has been of particular assistance to the Secretary with respect to the making of transportation arrangements. If as many as about fifteen passengers make reservations out of Washington, the northern terminus of this road, on any one train, a special car will be provided for their accommodation. Persons purchasing tickets, via Washington, over the Atlantic Coast Line are requested to inform the Secretary promptly of that fact, naming the exact train upon which they make their reservations out of Washington, so that if a sufficient number rendevous in Washington, a special car can be provided.

HAVANA NOTES.

PLACES OF MEETINGS. The headquarters of the Association will be at the Hotel Sevilla. The general meetings will be held in the rooms of the Ateneo and Circulo de la Habana. The Laboratories and the University will be used for the meetings of the Laboratory Section. Suitable accommodations will be provided for the Section on Vital Statistics and for the Section of Municipal Health Officers.

ENTERTAINMENT. Through the courtesy of the people of Havana, ample entertainment has been provided, arranged, however, with due regard to the business and scientific meetings of the Association. The main social features will be a trip to a tobacco plantation, a banquet at the National Theater, a picnic on the grounds of la Tropical Brewery, a Spanish-Cuban Verbena at the Hotel Sevilla, a trip to Morro Castle, Cabanas, and Triscornia Detention Camp, and a visit to the "Maine."

HOTEL ACCOMMODATIONS. Hotels available for members of the Association and others attending the meeting, are:

HOTEL SEVILLA. Headquarters of the Association—European plan, $2.00 up. American $5.00. Bath and telephone in every room.

HOTEL INGLATERRA. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

PLASA HOTEL. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

HOTEL PASAJE. European plan, $2.00 up. American $4.00 up. Bath and telephone in every room.

HOTEL TELEGRAFO. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

Reservations may be made by writing directly to the hotels named or to the Secretary of the Local Committee on Arrangements, Dr. Federico Torralbas, Tejadillo, 36, Havana, Cuba.

NOTES OF INTEREST.

Passports are not needed.

Such articles as the tourist ordinarily carries with him may be taken into Cuba without payment of duty, but upon return to the United States travelers are subject to ordinary custom house regulations.

Money of the United States is accepted in Cuba. Exchange is always in favor of American currency. Railway fares, hotel rates, and so on, are generally quoted in American money, but cab fares and shop prices are given in Spanish money. It will be found convenient to obtain a supply of Spanish money on arrival at Havana. Such money may be obtained from the money changers frequently found at the street corners.

During most of the winter, such light summer clothing as is used in the United States may be worn. Thin overcoats, however, are apt to be needed on the boat en route, and are sometimes comfortable, even in Cuba. Warmer clothing may be useful in case of a prevailing north wind.

GENERAL ASSOCIATION OFFICERS.

President.......................... Dr. Robert M. Simpson, Winnipeg, Canada.
First Vice President............... Dr. Fernando Lopez, Mexico City, Mexico.
Second Vice President.............. Dr. John F. Anderson, Washington, D. C.
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Secretary.......................... Dr. Ernest C. Levy, Richmond, Virginia.
Recorder........................... Dr. Charles V. Chapin, Providence, R. I.

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COMMITTEE ON SECTION ON SANITARY ENGINEERING.

Chairman........................... Col. Jacob L. Ludlow, Winston-Salem, N. C.

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All communications intended for the Local Committee on Arrangements should be addressed to Dr. Federico Torralbas, Secretary, Tejadillo, 36, Havana, Cuba.

Special Rates to Havana on Ward Line. In view of the fact that a sufficiently large number of members have signified their intention of going to Havana via the Ward Line from New York, the steamship company has granted a special rate of $70.00 for the round trip, meals and berth included. This rate is limited to members and their immediate families. Tickets will be on sale November 15 to 22, inclusive. Requests for staterooms reservation, giving the names of those for whom reservations are desired, should reach the officers of the company not latter than November 15, in order to insure proper assignment.

The Steamship Morro Castle will leave New York on Wednesday, November 29, at 3 p. m., and is due to arrive in Havana on Sunday, December 3, or, at the latest, on Monday morning, December 4. For the return voyage the Steamship Saratoga will leave Havana at noon Saturday, December 9, arriving in New York on Tuesday morning, December 12.

Applications for staterooms should be addressed to the general office of the New York and Cuba Mail Steamship Company, Pier 14, East River, New York.

The return portion of the special round trip tickets will be good to return from Havana on any steamship sailing from that port during December, limited only to the last sailing from Havana in December.

BOOK REVIEWS.

The Reduction of Domestic Mosquitoes, Instructions for the Use of Municipalities, Town Councils, Health Officers, Sanitary Inspectors and residents in warm climates, by Edward Halford Ross, Late Health Officer, Port Said and Suez Canal District. P. Blakiston's Son & Co., Philadelphia, 1911, pp. 114, ff. 18.

This is a well written book, by a man who knows his subject, who writes with conviction, and whose practical experience entitles him to the conclusions that he reaches.

Unfortunately, the conditions under which Mr. Ross has worked are utterly unlike those that occur in those portions of the United States where campaigns have been, or are likely to be, carried on. Mr. Ross is no entomologist, and that is made clear by a number of inaccuracies in speaking of different species of mosquitoes and of other insects affecting them. The two species dealt with in the book are *Stegomyia calopus*, the yellow fever mosquito which does not occur in our more northern states at all, and *Culex fatigans* which in the tropics replaces the common rain-barrel species, *C. pipiens* of the temperate portions of the United States. This may not seem matter of much moment at first, but there is enough difference in the habits and life history to make it of practical importance.

Mr. Ross professedly deals with conditions as they occur in warm climates where natives are to be dealt with, and much time is devoted to telling how natives should be managed, how squads should be organized and how they should be kept to their work. No one can read the accounts given without being impressed by the patience, tact and ingenuity exercised by the author to secure his ends; and yet no American health officer or organizer of a mosquito campaign would dare to use this experience as a guide, because the cost would be out of all proportion to the results obtained.

No use is made of American literature and the references to it are of the slightest, while the problems of dumps, sewer catch-basins, and spring puddles are not referred to at all or only in the most cursory manner.

The *Anopheles* species, which are in our cities and towns quite as much house-mosquitoes as *C. pipiens*, are not within the scope of the book and yet these species form the foundation for the authority which is given our boards of health, in most cases.

To sum up, the book is an interesting record of what can be done under decidedly adverse conditions, and should be an encouragement to organizers of mosquito campaigns. It is in no sense a guide that can be followed in any campaign in this country, and takes no account of several species that become real "house mosquitoes" with us at times.

JOHN B. SMITH.

Modern Methods of Sewage Purification, by G. Bertram Kershaw. London, Charles Griffin & Co., Ltd., 1911. pp. 356.

This is a most excellent book. The author was for twelve years the engineer to the Royal Commission on Sewage Disposal, and during this period he had opportunity to become thoroughly familiar with the art of sewage purification. He shows his broad mindedness in the following quotations from the preface:

"Sewage treatment does not lend itself to patents. There is no best method of sewage disposal which can be universally adopted regardless of local conditions. On the other hand, there are many methods, each one of them good in its own particular way when properly designed and when suited to the local circumstances. In many instances it may be found that two or more processes will in all probability give equally good results and it then becomes a question of which is the cheapest, all things considered, *i. e.*, what will be the initial cost and working and maintenance charges? Will one system continue to work efficiently for as long a period as another without renewals, etc.? All these questions have to be carefully weighed before any definite decision can be arrived at."

The book at hand is an attempt to answer these various questions in a practical sort of way and from an engineer's point of view. This is not so much a book for the general reader as for the specialist, but it is one of the best books now available for the advanced student. The author has put a great deal of personality into the book and as he is very evidently endowed with good judgment and also with a sense of humor, which crops out in places, the work is not only instructive, but entertaining.

As might naturally be expected, quotation is very freely made from the reports of the Royal Commission on Sewage Disposal and particularly from the fifth report. Nearly all of the illustrations are from English practice and almost no space is devoted to German, French and American works, a fact that should be borne in mind by the reader in the author's comparisons of various methods.

The book has one excellent feature not always found in books of this character, namely, the frequent enumeration and comparison of the advantages and disadvantages of various processes. This comparative method is applied even to details of construction, and at times becomes monotonous, but nevertheless it is of the greatest use to students of the subject.

There are seventeen chapters, which cover the following topics: Historical, Conservancy Methods, Drainage Areas, Sewerage Systems, Storm Water, Variations in Flow of Sewage, Composition of Sewage, Sites for Sewage Disposal Works, Preliminary Processes, Disposal of Sludge, Land Treatment of Sewage, Contact Beds, Percolating Filters, Trade Wastes, Stream Pollution, Description of Works in Actual Operation. Comparing the space allotted to these various topics, it will be found that the most ample treatment is given to the land treatment of sewage and the disposal of sludge. In this respect it differs somewhat from most modern books, which are rather inclined to place the greater emphasis on the newer processes, such as the use of contact beds and percolating filters. The reason for this may lie in the author's greater personal experience with land treatment, but it is nevertheless valuable to have a work covering sewage irrigation in so thorough a manner.

The second chapter contains an excellent resume of the history of sewage disposal in England since the Public Health Act of 1848. Those unfamiliar with the reports of the many commissions that have studied the subject in England will appreciate this resume, which closes with the conclusions of the Royal Commission set forth in their sixth and latest report, published February 9, 1909.

The chapters on rainfall and storm water are well written, but the data are not generally applicable to American conditions. Although many types of storm overflows are described, those commonly used in this country are omitted.

Very little space is devoted to the character of sewage and throughout the book little attempt is made to give complete tables of analyses. Many will consider this a defect, but it can hardly be considered so when it is remembered that the omissions are made advisedly and for the purpose of confining the work chiefly to the engineering features of the problem. The chapters on contact beds and percolating filters are also well written and the short-comings as well as the advantages of these processes are set forth. The author does not approve of contact beds for small communities, as they need greater attention and better supervision than can be ordinarily obtained. In this and in many other matters the book reflects the opinions of the Royal Commission. The chapter on Trade Wastes is altogether too short and contains but little practical information, and this is also true of that on Stream Pollution.

The last chapter, on the Operation of Purification Works, describes very completely some of the smaller English plants, and contains many excellent maps and plans. American readers would be more interested, however, if, in addition, descriptions had been given of the sewage works in some of the larger and better known places.

GEO. C. WHIPPLE.

Conservation by Sanitation, by Ellen Richards. Wiley & Sons. Price, $2.50.

It is fitting, at this time, in reviewing Ellen Richards' book on "Conservation by Sanitation," to briefly mention her life work in sanitary science; for in her death the American Public Health Association has lost one of its most faithful and ardent workers. Her work on air, water and food have demonstrated two things: first, that certain branches of sanitary science have, until recent years, been sadly neglected, and second, that women can lead in scientific work and thought, even in the complex mechanical branches of sanitary science. If we may judge the future by her splendid work, we may justly expect much of women, at least along certain lines of sanitation.

Of all her works on sanitation and kindred subjects, her last book on Conservation by Sanitation is by far the most important, for in it is embodied nearly all of the results of her earlier work in addition to her last research work. Sanitary science is developing more rapidly, perhaps, than any other branch of science at the present time; what seems new and ultra-scientific today will doubtless seem old and behind the times tomorrow. But whatever may be the development in the future, Conservation by Sanitation will stand as one of the pioneer works.

The book is divided into two parts. The first, containing more than 200 pages, is given up to a general discussion of air, water and its source and supply, water works, efficient protection of water supplies, regeneration of water sheds, filtration and its efficiency, underground or natural filtered water, and disposal of wastes liable to contaminate water supplies. The second part is given up to a discussion of analytical methods, analyses and their interpretation, inspection of ventilation and of water supplies.

The first three chapters consist largely of a discussion of air as one of the great natural resources to be conserved and kept pure. The facts presented are general, but embody, besides the principles of ventilation, those things which appeal to any

one interested in pure air. The temperature and humidity curves of comfort and discomfort are especially interesting, but might, perhaps, have been made more so by the addition of carbonic acid gas curves.

The ten chapters following air are devoted to water from the broadest possible sanitary point of view. Three of these are taken up in a discussion of water supplies and water works. In connection with these subjects, the development of the sanitary ideas of standards of purity as determined from chemical analyses and the inalienable right of the people to have pure wholesome water are carefully discussed.

The chapters on the protection of water supplies and on regeneration of watersheds are of exceptional interest. Various illustrations are given and authorities quoted in order to show why, in certain localities, it has become absolutely necessary to guard the sources of supplies, not only by controlling the bodies of water themselves, but also by guarding the whole watersheds against pollution.

The chapter on filtration is brief but at the same time complete, giving an outline of practically all of the present methods of water filtration. Not only has the author given these various methods, but she has also given her own ideas on filtration which are clearly set forth in the following lines: "There is no doubt in the author's mind of the ideal method of treatment of spoiled water. It is coagulation and decolorization by electrically prepared aluminum hydrate in the water itself, followed by filtration after subsidence and then, just before entering the mains, an aëration by ozonized air." It is evident from the above that the author regards pure water of such vital importance that the idea of cost should not even be considered.

One chapter is given to the subject of sewage disposal and the disposal of wastes liable to contaminate water supplies. Numerous abstracts from various sources are given in explaining the various methods.

The second part consists entirely of laboratory exercises on air and water prepared for students of sanitary science. They consist largely of the ordinary chemical methods such as are given in any regular course in water and air analysis.

While Conservation by Sanitation will doubtless be read by the layman, it was evidently written for those who are or intend to be actively engaged in sanitary science. This seems quite evident from the last chapters which are devoted entirely to laboratory work.

The book will be found helpful to anyone interested in this vital problem of pure air and water.

GEO. B. FRANKFORTER.

Personal Hygiene and Physical Training for Women, by Anna M. Galbraith, M. D. 12mo. Illus. 371 pp. W. B. Saunders Co., Philadelphia.

Every woman will find this book full of helpful information. It is comprehensive, dealing with all sides of personal hygiene. Written in a clear straightforward way, very free from technical terms, it is easily read, and the average woman will be able to strengthen herself, and make herself less susceptible to disease and more able to lead a joyous and helpful life because of her study of it.

It is a well known fact that women in general believe they are getting sufficient exercise if they take a short walk in unhygienic clothing or do the housework in a small flat with all modern appliances. Dr. Galbraith deals with the questions of

exercise and dress with commendable fearlessness. Her chapter on the "Cause of Woman's Physical Deterioration" points out clearly the laws which should govern sensible women in the important questions of clothing.

In all parts, however, the book is not clear, as, for example, the following statement which appears on page 264: "The front part of the sole of the shoe must be so designed that the great toe will retain its normal position and rest on the inner border of the sole. In many shoes the great toe is forced out of its natural position toward the middle of the sole, and the tip, instead of pointing straight forward, is thrust toward the line of the sole." Few who have not studied the natural shape of the foot would understand by this that the deformity which she is trying to guard against is that shape of the foot which is caused by crowding the great toe against, or making it overlap, the second toe, which deformity usually results in a bunion.

It is unfortunate, for the purpose of study, that all the material dealing with one phase of the subject is not gathered together instead of occupying parts of chapters widely separated, but the index to the book partly compensates for this.

The exercises, which appear with excellent illustrations, in the chapter on Symmetric Development, are well chosen, and if practiced with common sense will prove helpful to almost every woman. In some cases the classification is not accurate. For example, it is hard to understand why the alternate kneeling, and especially the squatting (p. 332) should be classed as predominately abdominal exercises.

If read by the general public the very great distinction between social and gymnastic dancing, as made clear on pp. 339-ffl., will do much to make this valuable part of physical training more generally tolerated.

The book is well gotten up, with numerous half-tones illustrating the text. It would serve well as a textbook for women students and would make a good reference book for any woman.

Gertrude E. Moulton.

Instructor in Physical Training,
University of Illinois.

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EDITORIALS

PUBLIC HEALTH AND PUBLIC HYSTERIA.

"MAN LIVES" wrote the shrewd and sunny Stevenson "not by bread alone, but mainly by catch-words." In that quaintly expressed truth is found one potent obstacle to hygienic progress. Because the public, led astray by the fear of a word, misbelieves or disbelieves the true danger, we must, perforce, waste strength in fighting shadows, while the real enemy exacts its ceaseless toll of life, all but unchecked.

Take an extreme case. Only a few years ago a wretched alien leper was harried from state to state in this supposedly enlightened country, until he met a miserable death from terror and exposure, incidentally scaring several hysterical cities quite out of their wits. One of those cities, without alarm or shame, had suffered several years of typhoid fever with a mortality some two hundred per cent. greater than the average rate for this nation. Another, just before the leper's advent, had undergone an epidemic of whooping-cough, which materially helped to fill the cemeteries with little graves, but which created no particular comment because it was "only whooping-cough"—as if a person dead of one disease were not exactly as dead as a person dead of any other. Again, a third

community, which rose in panic against the leprous fugitive, was then, and is now, notorious for its needlessly high infant mortality. Yet, in the face of real and persistent perils, these places shrank horrified from a casual and baseless threat.

Why? Because the word "leprosy" is made a synonym for terror in the most widely read of all books, the Bible. It is impossible to ascribe the panics to any other cause. Not one American in ten thousand has ever seen a case of leprosy, or knows from personal knowledge, anything of the disease. Never has it gained any foot-hold in this country; there is no reason to believe that it ever will or can. The man with a sore throat—yes, or with an inflamed eye—who brushes against you in a street-car or uses the public drinking cup or towel before you, is a more real peril than any leper. But the leper has upon him the brand of our profoundest tradition. He is marked with the terror of a word.

With cholera the case is at least more apparently logical, in that the great Asiatic pest has reaped its harvest in America in the past. That it will ever again break through our defenses and establish itself, is not more probable than that New York will be destroyed by a tidal wave or Chicago by an earthquake. Nevertheless, there is a panic power in its name. Who can doubt that if a hundred cases of cholera were to appear in various parts of the country, the government's health authorities could have a million dollars to fight it? How much can they get today to handle the hundred thousand dangerous cases of tuberculosis scattered abroad throughout the nation?

When one of our recurrent cholera scares was winging its high-typed way through the daily papers, the health officer of a "threatened" city was visited by a reporter.

"Your paper" said the official "printed a scare-head article today about the Asiatic peril at our doors".

"Yes" said the reporter: "What's new?"

"I've got a better story for you".

"Produce it."

"A graver peril to the city," continued the public's physician, "far graver and far less easily coped with. In fact, I don't mind telling you privately, we're at our wit's end, officially, in the matter."

"Well?" said the newspaper man impatiently.

"There are over a hundred cases of tuberculosis in the Devil's Hollow Tenements," answered the physician, portentously.

The reporter laid his pencil on his paper and regarded the physician with suspicion.

"Is that an unusual number?" he asked.

"No; its quite usual."

"Then where's your good story?"

"That is."

"What?"

"That it's usual."

The reporter took it under consideration. "I see," he said at length, "but I don't think my paper will see."

And it didn't. It never does. Fear is news. The basis for fear is not.

Semi-hysterical dread still attaches to certain diseases, over others equally or almost equally dangerous. Say "scarlet fever" to the average mother of a family, and she turns pale. Try her with "measles" or "whooping-cough" and, unless she is exceptionally well informed, she will laugh off the prospect with some reference to the "unavoidable diseases of childhood." From the purely individualistic standpoint she is right. If scarlet fever invades her family, the danger is greater than in the case of the so-called "unimportant diseases." But the family is not an isolated unit. It is open by a thousand media of communication to the influences of its community, and once measles or whooping-cough has gained a start in the community, the peril to every family is as great as from scarlet fever. If statistics show anything, they show that each of these "unavoidable diseases of childhood," (a phrase which itself embodies both ignorance and cowardice) whooping-cough and measles, is practically as deadly as the dreaded scarlet fever—dreaded because the public has been misled again by the terror of a word.

Worst of all is that form of hysteria which, for want of a better term, I may call the hysteria of prudery. Hygienists are agreed that, with the exception of tuberculosis, venereal disease is the profoundest peril to health which we have to face in this country. How do we face it? Generally speaking, we don't face it at all. We turn our backs on it, and cover our eyes, and a good many of us emit modulated and well-bred shrieks to indicate that we are properly shocked. Meantime our children grow up uneducated and undefended, except for such casual information or misinformation as they may derive from curious and often purient fellow-ignorance. That the atmosphere is clearing, there can fortunately be no doubt. A speaker may deal frankly with sex-hygiene, today, on platforms from which he would have been angrily driven a few years ago. Newspapers, which have been virtuously indignant at the mere idea of mentioning "private diseases," (except in quack advertisements, heavily paid for) will now print, more or less guardedly, the warnings of medical officialdom; and many of them have even cast out the quacks. Within a

year a hygienist of national reputation has been invited to speak before several women's clubs on this vital topic.

But it does not follow that proper publicity is yet obtained, or that the general public has been educated, even to the point of receptivity. Not long since, the physical director of one of the greatest American colleges prepared a course of lectures to the students on personal hygiene, two of which were to be devoted to venereal disease. After the delivery of the first lecture such a storm of protest was stirred up, mainly by the wives of the trustees and the faculty, that the second address was abandoned.

Again, a certain semi-official organization requested an expert on public health topics to deliver a lecture to college men at various institutions, giving them practical advice as to the avoidance of prevalent diseases.

"Very well" said the man. "On one condition, that I be permitted to treat venereal diseases with the same frankness as tuberculosis or typhoid."

The request, while not actually withdrawn, was allowed to lapse. The hysteria of prudery was too much feared.

In the matter of the hysterical attitude toward venereal disease, there is a wheel within a wheel. The idea that of the two diseases, syphilis is incalculably the worse, and gonorrhea rather unimportant, is a fallacy of the widest acceptation. In fact, there does not inhere in leprosy itself more of the terror of a word than in syphilis. Yet, by and large, and with particular reference to innocent wives infected by their husbands, it is quite certain that as much damage is inflicted on the race by the little-considered infection as by the superstitiously-dreaded affliction. Syphilis can now be, in many cases, absolutely cured. But no man knows when gonorrhea, apparently eradicated, may reassert itself to the wreckage of the patient's life and the health of those dearest to him. To reconstruct the hysterical fear of syphilis into the just and logical dread due equally to both the sexual diseases, is perhaps the most vital problem of modern hygienic education.

It all resolves itself into a question of education; patient, unremitting instruction of the public, through the press, the platform, the pulpit, and the schools. Nowhere as in hygiene is that public capacity so needed which Bacon has set down as one part of wisdom, the capacity to learn, not from the names of things, but from things themselves.

Samuel Hopkins Adams,

Auburn, N. Y.

SPECIAL ARTICLES

EXPERIMENTS IN BOOK DISINFECTION.*

By L. B. NICE, Ph. D.,
Harvard Medical School.

In the January issue of this Journal, Dr. W. L. Beebe described a method for disinfecting books by carbo-gasoline. He recommended that books be immersed for twenty minutes in a 2 per cent. solution of carbolic acid in 88 Baümé gasoline. He made 65 inoculations using bouillon cultures and obtained growth in only one case.

In order to test this method I autoclaved several books, dried them in a sterile chamber, and inoculated them twenty pages apart, with loopfuls of agar, or bouillon cultures. The books were again placed in a sterile chamber, for forty-eight hours, that the cultures might thoroughly dry, in order to prevent danger of the organisms being washed off. They were then left in 88° Baümé gasoline saturated with carbolic acid (about a 2 per cent. solution) for one hour and then dried for ninety-six hours to let all the gasoline evaporate before cultures were made. Eighty inoculations were made; twenty-five of *B. coli communis*, twenty-seven of *Staphylococcus pyogenes aureus*, and twenty-eight of *B. diphtheriae*. Fifty-seven of these grew; fifteen of *B. coli*, seventeen of *Staphylococcus pyogenes aureus*, and twenty-five of the *B. diphtheriae*.

In order to determine whether saturated carbo-gasoline will kill bacteria when it is in direct contact with them, three test tube cultures each of *B. coli communis*, *Staphylococcus pyogenes aureus*, and *B. diphtheriae* were filled with carbo-gasoline. This was drawn off after one hour and ten minutes, and ninety-six hours later cultures were made. Growth occurred in two of the *B. coli* test tubes, in two of the tubes of *Staphylococcus pyogenes aureus* and in one of the diphtheria tubes.

The lack of growth in Beebe's experiments was probably due to his bouillon cultures being washed off by the gasoline, since two of his books were only dried one hour and the third not at all. In my own experiments, although the books were dried for forty-eight hours, growth occurred in 80 per cent. of the agar and 25 per cent. of the bouillon cultures.

*These experiments were made in the biological laboratory of Clark University, Worcester, Mass.

After repeated trials it was found to be impossible to make a stronger solution of carbolic acid in gasoline than about 2 per cent., so there seems to be no way of modifying the carbo-gasoline method to make it effective.

Various other methods have been recommended for disinfecting books. Steam kills the bacteria but injures the books. The same objection applies to dry hot air, for it must be used at a very high temperature in order to disinfect. Formalin is used for this purpose to a large extent but it has been shown by many investigators to be entirely ineffective, since gas cannot penetrate between the leaves of a book, no matter by what devices they are held apart.

Moist hot air is an entirely satisfactory disinfectant; for it kills all the bacteria, it does not injure the books and is inexpensive and easy to use. This method was perfected by Xylander and Findel working independently. Xylander's work is especially thorough, for he made more than a thousand inoculations. A temperature of 78° to 80° C. and 30 per cent. to 40 per cent. moisture for thirty-two hours will kill all non-spore bearing bacteria in closed books, even thick layers of tubercle bacilli, and does not injure the most delicate bindings in any way, even after months of disinfection. A higher temperature than 80° C. and more moisture than 40 per cent. is injurious to books. When a pile of books is being disinfected, a small thermometer should be placed in a thick book in the middle of the pile. The disinfection should be counted as begun when this thermometer reaches 70° C. which may be twelve hours after the thermometer on the door registers 80° C. The disinfection must continue for thirty-two hours in order to kill all the bacteria. I had perfect success with this method in more than seventy tests.

The apparatus necessary is simple. It consists of a double walled case of galvanized iron, with water filling the space between the walls. There are two doors, the inner of glass and the outer of galvanized iron. A thermometer and hygrometer are fastened to the inside of the glass door, so that they can be read without opening the apparatus. The shelves for the books may be of perforated galvanized iron or of wire. The moisture is supplied by a water pipe opening near the bottom of the disinfector so that the water drips slowly into a flat dish of porous material, such as unglazed clay or tile. This becomes saturated and gives up its moisture in the form of vapor. Heat is furnished from beneath by gas, gasoline, or oil burners. In such an apparatus, two feet wide, two feet deep, and three feet high, 300 to 400 school books can be disinfected at one time.

School books ought to be disinfected by the moist hot air method during vacations. Library books that are much in use should be disinfected at regular intervals. Boards of health should report daily to

schools and libraries all cases of contagious diseases, such as scarlet fever, whooping-cough, typhoid, dysentery, erisipelas, diphtheria, venereal diseases, smallpox and tuberculosis, and all books used by such patients should be disinfected by moist hot air.

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PRACTICAL MUNICIPAL MILK EXAMINATIONS.

By D. M. LEWIS, M. D.,
New Haven, Conn.

Much has been written concerning the bacteriological and cellular content of milk, and in how far counts thereof are accurate. Four years ago, under Dr. A. C. Abbott, of Philadelphia, we learned the technique and value of the Stewart centrifugal method, and we have since applied it to an average of 3,000 specimens yearly; after the first year, making the hard and fast rule that the presence of pus and streptococci combined in any sample should immediately result in shutting the source of that sample from the market until the trouble had been rectified, as shown by a second microscopical examination. The presence of dirt in consecutive samples, as shown by the presence of *B. subtilis* and allied organisms, together with confirmatory data from farm inspection, also came under the same rule unless attempts were made to correct the conditions. Otherwise, findings of pus alone, streptococci alone, blood, occasional dirt, or any combination of these, resulted in a warning being sent to the producer, which stated the findings and requested that the cause be located and corrected. Out of 500 producers, six went out of business the first year rather than clean up, while two discontinued business rather than locate infected milk. Since then we have had immediate response to requests for the correction of even minor troubles, and in every case but one, the source of the infected milk was located, usually by the producer, and less often by a veterinary. The one exception noted was in the case of a cow which showed nothing on physical examination and which was voluntarily cut out of the herd by the producer and sold for beef.

The first year, whenever pus or pus-producing organisms were found in any mixed sample of milk, we examined samples from individual cows, or from an entire herd if the producer suspected no particular animal, controlling the results by testing the herd individually before and after the trouble was located. In the majority of cases the producer picked out the animal at fault, while in a minor number corroboration of results was given by veterinarians.

By pus and streptococci we mean a very definite picture, i. e., the presence of polymorphonuclear leucocytes in any number whatsoever, but clumped,—that is, held together by the fibrin content. We regard only the

long chain variety of streptococci, of a type of which we shall mention later, as significant. In making smears of milk sediments by the Stewart method, we may find a stringy sediment which will give masses of pus cells from dozens to hundreds in the field, or we may find a sediment which is not ropey, but which shows on an average a half dozen pus cells, clumped. This, we most frequently find, depends on the volume of milk from which the sample came; that is, whether it was from the mixed milk of a small producer, or, on the other hand, whether it came from the mixed milk of one or more of the larger producers,—frequently, for example, from the mixed product of a dairy. In some cases pus in milk has been traced to tuberculous cows, in other cases to cows whose teats had been bruised. In such cases, a sample from the individual cow has shown the characteristic picture, not of small clumps, but of large clumps, where experienced judgment is not needed to say that there is some real trouble. In this connection we would emphasize the point that there are samples which show the characteristic clumped pus cells, but no streptococci. Incubation of such samples shows the causative organism. In a less proportion of cases where pus and streptococci are found, we find the presence of endothelial as well as polymorphonuclear neutrophilic cells; a picture not like the definite one previously described. These cases we have followed up and found all of them, thus far, to be from cows from two to five months previous to calving which have previously had garget, or which are out of condition, or tuberculous. In but one specimen out of 12,000 have we found the presence of staphylococci with pus. In a minor number we have found the prevailing pus cell not the neutrophile, but the eosinophile. In regard to what that picture represents, other than indicating inflammation, we have no data to offer.

Pus alone has resolved itself, either into a picture of clumped polymorphonuclear cells, where, on incubation, we find the causative organism, or one with isolated polymorphonuclear cells, the number of which may be hundreds per field. Yet in no case has the streptococcus been found in the latter picture, even on incubation, nor has evidence of cow trouble been found on physical examination. In some milk sediments we found a cell similar to the polymorphonuclear in size, but mononuclear and of non-granular protoplasm. This type of cell we have never found clumped, nor have we been able to trace any cow trouble in such milks, even where the cell content may be hundreds per field.

Streptococci alone furnish a large field for investigation. There are apparently numerous varieties of short and long chain streptococci. Of the former there is one type where the individual cocci in the chain are of varying size; these we class with the dirt organisms. The other common

type, where the individual cocci are of even size and small, we believe are forms of the lactic acid bacillus. Similarly, with the long chain streptococci we feel sure of two types: the first type, where the individual cocci are of the same size, and where the chains are coiled, we have yet to find without the association of pus cells, though, as we have stated, where pus cells alone are present, we may find them only on incubation. In the second type, the streptococci are similar to the varying sized individual cocci of the short chain variety and like them are classed as dirt organisms. Frequently one finds straight long chains of even sized streptococci but the chains are not as long, they are not found coiled, and have quite a different appearance from either of the two varieties previously mentioned. We have not found any cow trouble where such streptococci have been present in milk samples, nor have we discovered such a finding in milk samples which have been sent to the laboratory from sick rooms. We attach no importance to this type of streptococci in milk smears.

To summarize: One may examine the majority of specimens of market milk by the smear method and find them without appreciable cell content, and often without any demonstrable bacterial content, while the minority will give pictures such as we have described, and the samples from individual cows will give the same contrasting pictures, thus furnishing data by which infected cows can be discovered and isolated. We therefore believe that we have the most practical, quickest, and above all, an exceedingly thorough method, for demonstrating clean and contaminated milk.

The following is a common experience which illustrates the lack of value of numerical counts alone: A sample of milk sent to the laboratory, suspected to be the cause of an infant's illness, was found to contain pus and streptococci. The source proved to be from the best sanitary nursery-milk dairy in that part of the state. A control sample was taken immediately from the nearest source, and the same findings were recorded. Because of the progressiveness of the producer, he was personally interviewed. The laboratory findings and their meaning were laughed at by the producer and his weekly bacterial count of the nursery milk, made by an authority, was shown the writer. This report had just come in that morning, and the count, standing at but a few thousand, bore with it the statement from the authority that it was the best count that he had ever made. After much discussion, the producer called up his manager, asking him to find out what had been done with a certain cow that had been ordered out of the herd because one teat had been bruised by being stepped on. The manager found that on the previous day a green hand had

included the milk from that particular cow with the market milk. A sample from that cow and one from the remainder of the herd confirmed the previous finding. The year following, while the same producer was away for some days, we found his nursery milk showing pus and streptococci. Before the next milking the infected cow was found by this method, and later the finding was confirmed by physical examination. This brings up two points that are important; first, that while a producer's milk supply may be officially shut out from the city because of the presence of pus and streptococci in his market milk, yet from the speed with which samples from animals suspected or known to be infected can be examined by the laboratory, the trouble can be rectified in time to allow the next milking to come into the city; second, that the producers have kept a much closer watch on even minor cow troubles, as shown by the frequency with which producers during the past two years have sent in samples from cows which have been isolated, either because of known trouble, or to find out if the trouble has entirely cleared up, or because the producer was suspicious of some trouble of which he could find no evidence on physical examination. We have been assured by several producers that the laboratory has proved to be a most valuable aid to them in protecting their milk supplies.

The percentages of contaminated and dirty milks that we have found the past four years are of interest:

1907,	pus and streptococci	5. %	dirt, 37%
1908,	" " "	2.5%	" 26%
1909,	" " "	1.8%	" 23%
1910,	" " "	.14%	" 12%

Following are the statistics of mortality from infantile diarrheal diseases:

Periods	Births	Deaths Under 1 Year	Deaths Under 5 Years
1887–1890	9,748	383 or 3.92%	465 or 4.84%
1891–1894	10,623	445 or 4.19%	526 or 5.46%
1895–1898	11,512	457 or 3.96%	581 or 5.04%
1899–1902	11,469	411 or 3.58%	524 or 4.56%
1903–1906	12,589	437 or 3.47%	522 or 4.14%
1907–1910	14,264	367 or 2.58%	426 or 2.98%

Put in another form, for the periods designated, these statistics show that there have died from infantile diarrheal diseases, respectively one out of every 25, 23, 25, 27, 28 and 39 children born. During the last period, which is that during which milk examinations have been made, the infantile mortality for the periods under 1 year and under 5 years of age from diarrheal

diseases, contrasted with five previous periods of similar duration, has been cut very nearly in halves. This, in the absence of any other apparent factors at work, we believe is the result of milk inspection, and the Stewart method of milk sediment examination. While we believe that the greatest factor in reducing infant mortality will be that of teaching the mothers to feed the babies rationally, yet we feel confident that the detection and the shutting out of all supplies which show infected milk is a factor of but little less value. The value of artificially soured milk for sick as well as for normal infants is well known, and we do not feel that plate counts discriminate between these and truly dirty milk as does the smear method.

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THE PURIFICATION OF WATER BY ANHYDROUS CHLORINE.

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In June, 1910, the writer began a series of experiments with the object of determining the availability of commercial liquefied chlorine for the purification of water. It is believed that the use of chlorine in the gaseous form and dry state had not been used or proposed for the purification of domestic water supplies before that time. Previously chlorine as a purifying agent had been added to the water as "chlorine water" or as a solution of one of the hypochlorites; dry gaseous chlorine had not been directly applied to the water to be purified.

It was recognized that if an apparatus could be devised for accurately dosing the water with the dry gas, the method would be much superior to those using hypochlorites or chlorine water, because of the uniform strength of the purified, dry, compressed gas. It is well known that the hypochlorites are unstable compounds and the content of "available chlorine" is uncertain. This necessitates frequent examinations in order to determine the quantity to be used. Another objection to the use of hypochlorites is that more or less troublesome dosing devices must be used. It has also been found that a slight excess of the hypochlorites imparts a disagreeable taste and unpleasant odor to the water.

At the present time chlorine is made in large quantities by the electrolysis of salt. In fact it is a by-product in the manufacture of caustic soda. Most of the chlorine so obtained is used to make calcium hypochlorite and other hypochlorites, but a considerable quantity is purified, dried, liquefied by pressure, and put on the market in steel drums or cylinders holding from 100 to 140 pounds each. This chlorine is almost chemically pure, containing nothing except traces of oxygen, carbon dioxide, and nitrogen. In putting up chlorine in this way all water vapor must be removed in order to prevent corrosion of the steel used in the construction of the storage drums. The pressure of this liquefied chlorine on the walls of the drum varies from 54 pounds per square inch at 32°F. to 216 pounds at 122°F.

The price of liquefied chlorine varies from fifteen to twelve cents per pound, depending on the quantity. I have been informed by producers, however, that it is probable, if the demand for it should grow, that the price would soon be much less than it is at present.

From the Chemical Laboratory, Army Medical School.

It may be well, before proceeding further, to briefly state certain properties of chlorine which have a direct bearing on its application as a purifying agent for water.

1. Chlorine is an elementary gas having a strong affinity for hydrogen.

2. It attacks metals, but (with some exceptions) only in the presence of water or other compound, from which, by appropriating hydrogen, it can liberate oxygen. This oxygen is the corroding agent. Hence *dry* chlorine can be kept in steel drums indefinitely and may be conducted through iron, brass, or copper pipes, and valves without undue corrosion, provided water and water vapor (moist air) are excluded therefrom.

3. Its sterilizing action, so far as water purification is concerned, is conceded to be due, not to the chlorine itself, but to the action of nascent oxygen, the result of the abstraction of hydrogen from some of the water molecules by the chlorine. This liberation of oxygen may be shown by the following equation, which, however, expresses only the final reaction and not the intermediate reactions which may take place as a result of the interaction of chlorine and water:

$$2\ Cl + H_2O = 2\ HCl + O.$$

The oxygen atom is most active immediately after it is liberated. If it does not soon find other suitable matter to combine with, it becomes joined to another free oxygen atom, the two forming a stable molecule. This can be demonstrated by conducting a little chlorine into a beaker of water and testing from time to time with iodized starch (starch paste and iodide of potassium). At first a blue color is developed, but as time elapses the test shows a fainter blue until finally no reaction is manifest. This is because the oxygen, at first nascent and capable of liberating the iodine, has resumed its normal condition. Bearing this fact in mind, it would appear reasonable to assume, therefore, that to obtain the maximum oxidizing effect of the chlorine it should be conducted, in its gaseous condition, directly to the water to be purified. This, however, has not been the usual practice either for chlorine or the hypochlorites. Chlorine in the past has been used as chlorine water, while the hypochlorites are first mixed with water and the resulting chlorinated water is then added in proper quantity to the water to be purified. When used in this way much of the oxidizing effect of the nascent oxygen is lost.

4. Water at ordinary temperature will absorb about two volumes of chlorine. This is equivalent to about 4000 parts per million by weight.

This ready solubility of chlorine is of great importance in water purification, since it makes it unnecessary to use the elaborate mixing devices which would be required were the chlorine not easily soluble in water.

QUANTITY OF CHLORINE REQUIRED FOR PURIFYING WATER.

In practice, the quantity of chlorine required depends entirely upon the amount of oxidizable impurities in the water. These oxidizable substances may be inorganic or organic; and the latter may be either living or dead.

Water of low organic content, as shown by its "oxygen consumed" value, will require less chlorine than water showing a higher value. This is also true of other processes based on oxidation, notably the hypochlorite process, and the ozone process.

In general, it may be said that with an average unfiltered river water such as that of the Potomac, about one-half of a part (by weight) of chlorine gas per million of water will be required. For clear lake waters three-tenths to four-tenths of a part per million will be sufficient. That is to say, it will require from three to four pounds of liquid chlorine for a million gallons of water of average purity.

CHANGES PRODUCED IN WATER BY CHLORINE USED AS A PURIFYING AGENT.

1. Chlorine reduces the quantity of the organic and other oxidizable substances contained in the water, or removes them entirely, as the diminished oxygen consuming value of the water shows.

2. By the interaction of chlorine and water a relatively minute quantity of hydrochloric acid is produced. The hydrochloric acid thus formed is neutralized by the carbonate of lime normally present in the water, forming chloride of lime at the expense of a small portion of the carbonate.

3. Oxygen is liberated. A part of this nascent oxygen combines with the oxidizable impurities of the water, while the rest resumes its normal state and either remains dissolved in the water or escapes.

4. Physical changes.

(*a*) *Taste.*—When used in proper quantity pure chlorine imparts no taste whatever to water purified by it. At least two parts of chlorine per million (four times the quantity necessary to sterilize) must be added before even the slightest change in taste can be distinguished in Potomac River water. It is probable however, that the disagreeable taste imparted to certain waters by chlorine or hypochlorites is due not to the chlorine *per se* but to the products formed by the oxidation of organic matter contained in the water.

(*b*) *Odor.*—The purified chlorine must be used in excess before it imparts an odor of chlorine to the water. Even when sufficient chlorine is used to impart a taste to the water the odor soon disappears and is at no time unpleasant.

It will thus be seen that the chemical composition and physical character of the water are practically unaffected by the use of chlorine, limited in quantity to a reasonable excess over that required for purification.

(*c*) *Length of Time of Contact.*—The experiments made in the chemical laboratory of the Army Medical School, indicate that the purifying action of dry chlorine gas, when applied to Potomac River water, is practically instantaneous. If particulate matter in which bacteria are imbedded is in the water, the action of the chlorine is not so rapid, time being required for it to penetrate the particles. Furthermore, certain bacteria, or rather spores, notably of *Bacillus subtilis*, resist the action of chlorine even in large amounts and after long contact. As much as six parts of chlorine per million will not destroy all spores of *Bacillus subtilis*, when that organism is present in large numbers.

As the time required to kill the pathogenic bacteria is so brief, no provision is made for prolonged contact in the apparatus presently to be described. The water merely flows through it, absorbing chlorine in its passage, and may be used immediately on discharge.

SUPERIORITY OF LIQUEFIED CHLORINE AS A PURIFYING AGENT FOR WATER.

1. It is superior to hypochlorites in the following respects:

(a) It is of uniform composition and may be supplied by a simple apparatus, to the water in unvarying, predetermined quantity, adjusted to the requirements of the water under treatment. Hypochlorites rapidly deteriorate when exposed to moist air and must be tested frequently. Furthermore, it is difficult to adjust the quantity with certainty.

(b) Liquefied chlorine gas used in proper quantity imparts neither taste nor odor to the water, while a slight excess of the hypochlorites makes the water unfit for domestic use.

2. It is superior to ozone because:

(a) It is much cheaper.

(b) It is easier to apply chlorine than ozone. Chlorine, because of its great affinity for, and solubility in, water requires no elaborate and complicated mixing apparatus; mere contact over a comparatively small surface of the flowing water is sufficient. The water in its passage absorbs the gas and is further mixed in its onward flow through the pipe, conduit, or aqueduct.

DESCRIPTION OF CHLORINE WATER PURIFYING APPARATUS.

The apparatus described below was developed as a result of much experimentation and is believed to satisfactorily solve the problem of purification of water by chlorine gas. It consists of the following parts:

1. A pressure-reducing mechanism for reducing the high pressure of the compressed chlorine to a uniform low pressure, so that it may be possible to supply it to the water in uniform quantity.

2. A current reducing and regulating device placed between the pressure-reducing mechanism and the mixing chamber.

3. A mixing or absorbing chamber into which the chlorine is conducted, and through which the water to be purified flows.

4. A mechanism which automatically starts the flow of gas into the mixing chamber when the water is turned on and arrests the flow of gas when the water is turned off.

Referring to the diagram (page 788), 1 represents a tank, reservoir, standpipe, or other container in which a fairly constant water level is maintained.

The pipe 2 with a valve 3 leads from the reservoir and is continuous with another pipe 5 having a water-seal at 6 and a valve at 4. In operation the valve 3 is set so that it will deliver less water than pipe 5 and valve 4 are capable of conducting, so that pipe 5 is only partially filled with water. This pipe 5 constitutes the absorbing chamber into which the chlorine is conducted through the tube 36.

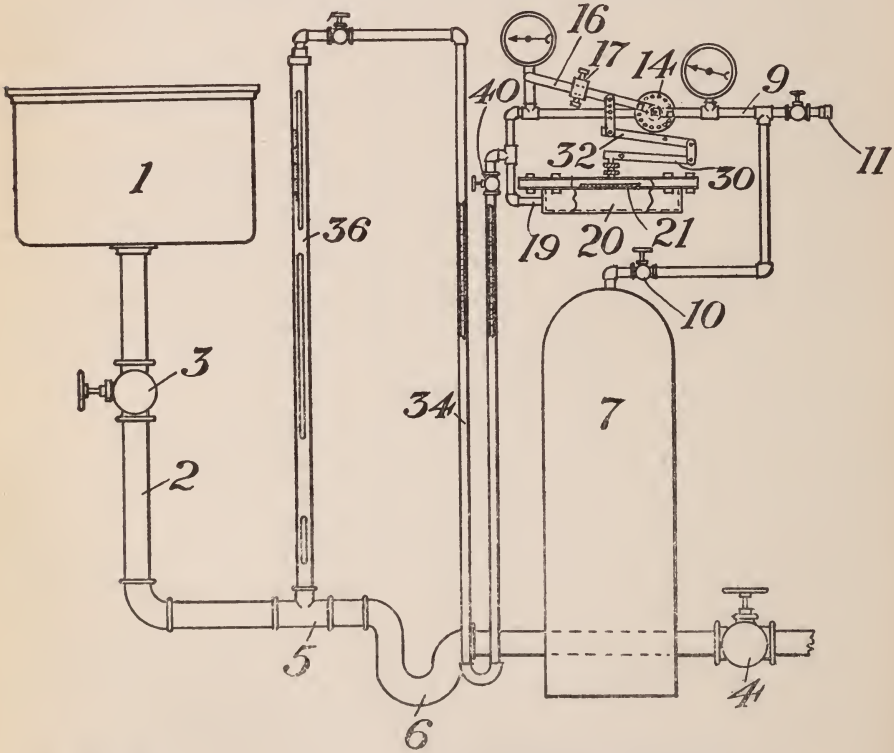
A drum 7 contains the compressed chlorine, and at 11 is shown a connection for attaching another drum, if it is desired to do so. A metallic gas receiver 20 is connected with the drum or drums by the pipes 9 and 19. The top of this receiver is a thin metallic sheet 21, to which is attached a set of multiplying or amplifying levers 30, 32, 16. One end of the lever 16 is attached to the stem of the valve 14, while the other end is provided with a movable weight 17.

At 40 in the chlorine pipe is shown another valve. In a large apparatus in which much chlorine is used the amount may be regulated by this valve, but where the quantity of chlorine required is small, say sufficient for an apparatus with a capacity of only 40,000 gallons of water per hour or less, it is better to employ some device less likely to be plugged up by dust, rust, etc., than would be the valve with such a minute opening. This is done by opening valve 40 to its limit and interposing resistance in the "U" tube 34 by partly filling it with sand, powdered glass, or other material not acted on by chlorine. The resistance can be changed by using material of suitable size and varying the depth of it in the tube. From the tube 34 the chlorine passes through tube 36 into the absorbing or mixing chamber 5.

OPERATION.

When valve 10 of the chlorine drum is opened, chlorine passes through tube 9 and valve 14 into pipe 19, gas receiver 20, and resistance tube 34. Because of the resistance offered by the sand in the tube, the pressure in the receiver 20 rises and lifts the diaphragm 21, and the levers operated by it, and closes valve 14. As the gas passes through the sand in tube 34 the pressure in chamber 20 falls and the levers descend, opening valve 14, thus permitting more gas to pass.

CHLORINE WATER PURIFYING APPARATUS.



1. Reservoir.
2. Water Supply Pipe.
3. Water-regulating Valve.
4. Discharge Valve of Mixer.
5. Mixing Chamber.
6. Water Seal.
7. Chlorine Drum.
9–19. Chlorine Pipe.
10. Chlorine Drum Valve.
11. Connection for Another Drum.
14. Chlorine-regulating Valve.
16. Lever Attached to Chlorine Valve.
17. Weight to Regulate Working Pressure of Chlorine.
20. Metallic Chlorine Receiver.
21. Metallic Diaphragm.
30–32. Amplifying Levers.
34. Resistance Tube.
36. Chlorine Supply Pipe.
40. Valve.

Valve 4 in the main 5 being open, the water will flow through the mixing chamber 5, and as it comes into contact with the chlorine will absorb it. The chlorine and water are further mixed in their passage through

water seal 6 and the main beyond. The purified water is discharged through valve 4. The quantity of chlorine going to the water may be regulated by shifting the weight 17 on the lever 16.

Once adjusted, the quantity of chlorine delivered by the apparatus in a given time will be constant, for it flows under a constant uniform pressure. The quantity of water flowing through the mixing chamber 5 will also be constant for a given time, since it is under a constant head. Therefore, by adjusting the flow of chlorine to the flow of water, a practically uniform mixture of the two may be attained.

It may be stated here, that in practice the quantity of chlorine necessary to purify a water is determined by testing the flow from valve 4 with a mixture of starch paste and iodide of potassium. The apparatus should be so adjusted that the water shows a sky blue color when it flows into a white dish or cup containing a few drops of the test mixture.

Automatic Chlorine Cut-off.—If valve 4 be closed, the flow of water in pipe 5 will be arrested, and the back pressure will cause it to rise in pipe 36 and stop the flow of chlorine. When valve 4 is opened the water in pipe 36 will flow out and the supply of chlorine will be re-established.

Of course this form of apparatus is only one of several that may be used; it is described here merely to illustrate the application of the process of purifying water by chlorine.

DATA RELATING TO THE PRACTICAL APPLICATION OF THE CHLORINE METHOD.

There is now in the Chemical Laboratory of the Army Medical School a small apparatus constructed on the lines shown in the diagram. This apparatus has a capacity of about 800 gallons per hour, occupies very little space, and weighs less than 200 pounds. The chlorine feeding and regulating mechanism of this small apparatus, with a few minor alterations, is large enough to supply chlorine for a mixer having a capacity of 1,000,000 gallons per hour. This particular apparatus has been in use now for more than six months and has given no trouble whatever. The process is believed to be applicable for use in purifying water supplies for cities, towns, factories, hospitals, etc.

1. Cost of installation of plant.

For cities already having aqueducts, reservoirs, pumping machinery, etc., this item would be very small. The mixing chambers, may be constructed of concrete, iron, terra cotta, or other suitable material. In some cases it may be feasible to utilize an aqueduct itself as a mixing chamber.

It may be well to state here that a mixing chamber sixteen inches in diameter and twenty-four feet long has a capacity of 750,000 gallons per day, while one thirty-two inches in diameter and fifty feet long has a

capacity of 3,000,000 gallons. In order to convey an idea of the size of plant necessary, it may be said that to purify 750,000,000 of gallons per day (the quantity furnished greater New York), sixteen mixing chambers ten feet in diameter and two hundred feet long would be required. These would occupy about one acre of ground.

2. Cost of labor.

The item for extra labor would be trifling in amount for small or large plants. In the former all labor could be performed by the men operating the pumping machinery already in use; while in very large plants only one mechanic to look after the chlorine feeding apparatus, and a man or two to change the chlorine drums as they become exhausted, would be necessary.

A one hundred and forty pound drum of chlorine is sufficient for, say, 35 to 45 million gallons of water; therefore, by using a number of drums simultaneously frequent changes would not be necessary.

3. Cost of chlorine.

This will range from about thirty-six cents to fifty cents per million gallons of water treated, depending of course upon the quantity of chlorine used. As stated elsewhere in this paper, chlorine costs about twelve cents per pound and waters containing only a moderate amount of oxidizable impurities will require from three to four pounds per million gallons.

EFFICIENCY OF THE METHOD.

A working model of the apparatus with a capacity of 500 gallons per hour having been constructed, the writer, early in January, 1911, reported to the Surgeon General of the Army the results of the experiments made with chlorine and requested that the method be examined to determine its availability for use in the military service.

By order of the Secretary of War, this investigation was undertaken by a board of officers appointed in 1909 to investigate and make recommendations in regard to water supply and sewage disposal for permanent military posts, etc. The investigations of this board began early in February and continued until May, the report of the results being made by the board June 1, 1911.

The first series of efficiency tests was made at the pumping station at Fort Myer, Va. As stated by the board in its report: "The Board determined that in order to procure a typical water for experimentation which was somewhat polluted and had not been purified by filtration, the apparatus should be installed at the pump house of the intake of the Fort Myer water supply." The apparatus was accordingly set up by the side of the mechanical filter and operated continuously (day and night) for two weeks.

Table No. 1 shows the results of this series of tests:

TABLE I.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 1)

These tests were made at the pumping station at Fort Myer, Va. The water supplied to the chlorine apparatus had been treated with alum and contained much particulate matter and was turbid, at times quite muddy.

No. of Sample	Date of Collection and Examination, 1911	Tubes containing gas after Incubating 48 Hours			Number of Colonies after 48 Hours			Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		River Water	Water from Mechanical Filter	Water from Cl. Apparatus	River Water	Water from Mechanical Filter	Water from Cl. Apparatus		
1	Feb. 10	50	20	0	1000	300	90	.80	No
2	Feb. 11	50	10	10	170	45	60	1.20	No
3	Feb. 13	0	0	0	160	40	70	6.10	Yes
4	Feb. 14	10	0	0	400	130	75	.50	No
5	Feb. 15	20	0	10	3000	80	50	.50	No
6	Feb. 16	40	0	0	3000	95	75	.50	No
7	Feb. 17	90	0	10	500	0	140	1.00	No
8	Feb. 18	80	20	0	5000	100	100	.75	No
9	Feb. 20	70	0	10	3000	32	46	1.16	No
10	Feb. 21	40	20	10	800	75	60	.70	No
11	Feb. 23	20	10	0	500	175	200	.80	No
12	Feb. 24	10	0	10	1300	100	100	.80	No
Average,		40%	6.6%	5%	1569	97	88		

As stated by the board, "The fact that this water had been treated with alum, operated somewhat to the disadvantage of a chemical sterilizing process, because the particles of sediment, when coagulated by the alum, protected the bacteria contained within the particles to a certain extent from the action of the ozone (nascent oxygen). As will be seen, however, from Table I (Series No. 1), the chlorine apparatus showed a greater reduction of gas-producing and other bacteria than did the very excellent mechanical filter in use for the Fort Myer water supply. The organisms not destroyed were harmless saprophytes, principally spore bearing bacilli (*bacillus subtilis*), which can only be destroyed by prolonged boiling. The bacteriological tests of the water from the apparatus were made in the bacteriological laboratory of the Army Medical School, under the direction of a member of the board, who is chief of the laboratory."

It will be noted that the amount of chlorine used in this series of tests varied from 0.5 of a part to 6.1 parts per million, as determined by titration, and that only in test No. 3, did the water have a taste or odor of chlorine. In this case the excess of chlorine was used in order to see if it were possible to produce absolute sterility. As a matter of fact the result was no better than in numbers 4, 5, and 6,—in which only one-half of a part of chlorine per million was used.

The great variation in bacterial content exhibited by the raw water was due no doubt to the influence of the tide and condition of the river.

TABLE II.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 2)

The raw water was a mixture of eight parts tap water and one part of river water, obtained near the mouth of a sewer. It contained considerable particulate matter and was quite muddy. Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Collection and Examination 1911	Percentage of Tubes Containing Gas After 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus		
1	March 4	100	0	1100	100	1.00	No
2	March 5	100	10	2500	64	.75	No
3	March 6	100	0	1800	45	.50	No
4	March 7	100	10	2000	98	.50	No
5	March 8	100	0	700	70	.50	No
6	March 9	100	0	700	60	.50	No
7	March 10	100	0	900	80	.40	No
8	March 11	100	0	875	90	.50	No
9	April 3	100	10	500	45	.50	No
10	April 4	100	0	300	75	.50	No
Average,		100%	3%	1137	73		

Again it will be observed that 0.5 of a part of chlorine per million was quite as effective as larger quantities. The surviving bacteria, as in series No. 1, were chiefly *bacillus subtilis*.

TABLE III.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 3)

The raw water was a mixture of two parts of tap water and one part of river water from near the mouth of a sewer. Considerable particulate matter was present and the water was quite muddy.

Rate of flow through appratus, 430 gallons per hour.

No. of Sample	Date of Collection and Examination 1911	Percentage of Tubes Containing Gas After 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus		
1	April 5	100	10	3500	60	.50	No
2	April 6	100	20	1200	50	.50	No
3	April 7	100	20	5000	45	.50	No
4	April 8	100	10	3500	50	.50	No
5	April 10	100	20	2000	100	.50	No
Average,		100%	16%	3040	61		

This series is of interest in that it shows the influence of an excess of organic matter. The raw water contained, presumably, three times as much organic matter and bacteria, as that used in series No. 2. It was muddy and had an offensive odor.

The quantity of chlorine used was one-half of a part per million, which was not enough, for while the bacterial content was reduced to a satisfactory point as shown by the colony count, sixteen per cent. of the tubes showed the presence of the colon bacillus.

The series of tests shown in Table IV, were made in order to determine the efficiency of the method in destroying the colon bacillus in the absence of particulate matter. It will be observed that under the conditions stated four-tenths of a part of chlorine per million was effective although considerable *dissolved* organic matter was present in the water.

TABLE IV.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 4)

The raw water used for this series of tests was made by contaminating tap water with the filtrate from fresh horse manure; 2-10 cc. of filtrate being added to each gallon.

Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Examination	Percentage of Tubes Containing Gas After Incubating 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?	Remarks
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus			
1	April 13	100	0	1200	50	.40	No	This water contained no particulate matter. The bacteria not destroyed were spore formers chiefly *bacillus subtilus.* Considerable organic matter present in the raw water.
2	April 14	100	0	1200	50	.40	No	
3	April 15	30	0	300	60	.40	No	
4	April 17	20	0	400	50	.40	No	
5	April 18	100	0	300	25	.40	No	
6	April 21	100	0	3000	50	.40	No	
7	April 22	0	0	1200	80	.40	No	
8	April 24	10	0	600	70	.40	No	
Average,		57.5%	0%	1025	55			

TABLE V.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 5)

Raw water consisted of a mixture of four parts of tap water and one part of river water, obtained from the Potomac River below the mouths of sewers. At times it was very turbid and contained much particulate matter. It was strained through cloth to remove the larger particles.

Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Examination	Percentage of Tubes Containing Gas After Incubating 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?	Remarks
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus			
1	April 25	90	0	3500	160	.40	No	
2	April 26	30	0	4000	110	.40	No	
3	April 27	100	20	1000	80	.40	No	Water very muddy.
4	April 28	50	0	1500	70	.40	No	The organisms surviv-
5	April 29	100	0	6000	60	.40	No	ing were chiefly *bacillus*
6	May 1	10	0	2000	20	.40	No	*subtilis*.
7	May 2	80	0	2800	85	.40	No	The variations in the
8	May 3	0	0	5000	60	.40	No	raw water were prob-
9	May 4	0	0	2500	100	.40	No	ably due to the tide and
10	May 5	0	0	1200	90	.40	No	state of river.
11	May 6	10	0	1100	150	.40	No	
Average,		42.7%	1.8%	2781	99			

In the first series of tests, made at Fort Myer, the water used was from the pump supplying the mechanical filter. The alum solution used was fed into this pump, and together with the finely divided clay in the water, formed flocculi in which many of the bacteria were imbedded, and were thereby protected from the action of the chlorine. This is believed to account for the presence of the colon bacillus in about five per cent. of the tubes in that series, although more chlorine was used than in series No. 4 in which all the *B. coli* were destroyed.

In the series of tests shown in Table V (page 795), the water was turbid, having in suspension much finely divided clay. It also contained many rather coarse particles which were removed by straining the water through a cloth. Four-tenths of a part of chlorine was used with the result shown in the table.

Having concluded its investigation of the method, the board referred to above summarized its findings and recommendations; from that summary the following extracts are quoted:

"It is the conclusion of the Board that this apparatus offers the following advantages over other methods of water purification now in use:

"(1) Efficiency.—It is believed that the apparatus (method) is as efficient as purification by ozone or by hypochlorite and is more reliable in operation than either.

"(2) Cost of Installation.—The apparatus is exceedingly simple and could be installed in connection with any water supply where the water is pumped into a tank or storage reservoir, at very small cost. * * * * * *

"(3) Cost of Operation.— * * * * * *

The cost of attendance would be very slight, as the apparatus is automatic and only requires the attachment of a new cylinder at infrequent intervals when the supply of chlorine becomes exhausted. * * * * * * ,"

"In view of the advantages which this apparatus is believed by the Board to possess over those now on the market, it is recommended that such an apparatus be installed * * * * at some post where the water is polluted and where no satisfactory system of purification has been installed."

COMPARISON WITH OTHER PURIFICATION METHODS.

In conclusion it may be well to compare this method with other well known means of water purification:

Anhydrous Chlorine and Ozone.

1. The efficiency is practically the same in the two processes.
2. The chlorine apparatus is much more simple and requires no delicate electrical machinery and no complicated mixing apparatus, such as is necessary with ozone.
3. The chlorine method is more reliable in operation and requires less labor.

4. It is also cheaper, costing less than fifty cents per 1,000,000 gallons for chlorine.

5. The chlorine method is applicable to plants of large size, which is not true in the case of ozone as applied at the present time.

Chlorine and Hypochlorites.

1. It is easier to regulate and adjust the quantity of chlorine than it is to regulate the quantity of hypochlorites. The gas is of constant composition, and under a given pressure a definite quantity will always pass through a given orifice in a unit of time, so when once adjusted to the flow of water no further regulation is required.

Hypochlorites, on the contrary, are variable in strength, change rapidly when exposed to air, and require constant care in order to properly regulate the quantity.

2. The chlorine method, the apparatus used being automatic, requires less labor than does the hypochlorite.

3. Since it is easier to regulate the quantity of chlorine than it is to regulate the quantity of hypochlorites, a disagreeable taste and an unpleasant odor are less likely to be imparted to the water when the former is used. It is probable that in this respect the superiority of chlorine is due, in part at least, to the fact that the liquid chlorine has been purified, while the hypochlorite has not.

4. At the present time the hypochlorites cost considerably less than does chlorine, about one-fourth in fact; but if the cost of the extra labor required in the hypochlorite process, and the waste during manipulation be considered, the difference in cost is not so great. Furthermore, it must be remembered that there has heretofore been very little demand for liquid chlorine, and consequently its manufacture has been limited. It is probable that if it were made on a large scale the price would be very much less than it is at present.

Chlorine and filtration.

1. Chlorine is more efficient than filtration in eliminating pathogenic organisms.

2. It is cheaper to install a chlorine purifying plant than a filter plant.

3. A chlorine plant is cheaper to operate because the labor required is so much less.

4. In the chlorine method no provision is made for clarifying the water, hence, for plants other than those drawing their supply from lakes or wells, it will usually be necessary to have sedimenting reservoirs or rough filters to clarify the water either before or after the application of the chlorine.

A REVIEW OF PRACTICAL METHODS FOR SUPERVISING THE MILK SUPPLY OF CITIES.

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Although the views of individual communities on the administrative control of the milk supply have been frequently described by various authors, yet a general consideration of this matter may be of interest to the sanitarian.

With the view of correlating the various methods used throughout the country for the supervision and control of the milk supply of cities and towns, and of comparing the results obtained by the use of certain general and accepted methods, lists of questions were sent out during the summer of 1909 to a number of the more important cities and towns. The replies to these questions, and a study of the ordinances, literature, and forms furnished by the health authorities addressed, form the basis of this paper. The questions and replies are given in tabulated form, and a discussion of the various methods in general use, or of a desirable character, will be taken up under their respective heads.

PERMITS.

Ninety-four per cent. of the cities represented require permits or licenses to be obtained for the sale of milk and cream. The advantage of this requirement is at least two-fold, for it provides for a list of all persons selling milk, and furnishes an effective means of compelling milk dealers to comply with the sanitary ordinances and regulations, a violation of which should cause the permit to be temporarily suspended or to be revoked. The inspectors should be empowered by regulation to temporarily prohibit the sale of milk on account of insanitary conditions of a dairy or store. Some cities have such a regulation, limiting the time for which an inspector may prohibit the sale of milk to forty-eight hours, and providing a penalty for the wilful or malicious suspension of the sale of milk without probable cause. The permits should, of course, be non-transferable and void for the sale of milk at another address than that for which it is issued.

The forms which the applicant for a permit must fill out vary considerably in the different cities, for their character is determined by local conditions. Some applications provide for a detailed description of the

surroundings of the dairy and the conditions under which the milk is produced and handled. For the registration of producers shipping milk to the city this seems advisable, especially if there be no means at hand for inspecting the dairy farms, but for the local dairies and stores it probably is better to have this data collected by the inspectors, and to limit the information required of the applicants to as simple terms as possible. He should give the names and addresses of all persons from whom milk is secured, with the station or place at which the milk is obtained, the names and addresses of all persons engaged in the handling of the milk, the average number of gallons sold daily, both in bulk and in bottles, the average number of customers served daily, and the number of vehicles used in the distribution of milk.

METHODS OF KEEPING RECORDS.

Perhaps the most convenient method of keeping all records is by the use of index cards. List of persons selling milk should be kept by name, by address, by permit number, and in the case of a dairy by the trade name.

In Baltimore, where there are about thirty-five hundred places where milk is sold, it has been found convenient to divide the city off into districts. A large map of the city, showing all streets with the numbers of the blocks, was secured, and into it were stuck tacks representing all places where milk was sold. Districts were then plotted so as to contain from fifteen to twenty-five dairies and stores, rubber bands being used to mark the boundaries of the districts. After the milk ordinances had been in effect for a year or so, it was found that the number of places in a district remained fairly constant; the tacks were then dispensed with, and the boundaries ruled off with ink on a new map. The district number of a dairy or store is recorded on all cards relating to that place. All of the dairies and stores in a district are written on a card, and the streets bounding the district are written on the reverse side. Every day, after the work of inspecting milk at the railroad stations has been completed, each inspector is given a district card and required to visit and inspect all places in his district where milk is sold. If he should find a place where milk is sold that is not on his district card, or if he should find that an address on his card is not within the boundaries of the district, he notes the facts, and corrections are made accordingly. He also reports all persons who may have moved or discontinued the sale of milk, and their cards and reports are withdrawn from the regular files, except the permit number cards, which are kept on file unless the permits were returned, in which case the numbers are used again when issuing other permits. If a person should report to the inspector later that he no longer sells milk or cream, and yet should retain the permit

and should resume the sale of milk, (which seldom happens), he is sure to be added again to the lists by the next inspector, because he visits all places within his district. All places are inspected on an average of every six weeks, and no inspector is re-assigned to a district until he has had every one of the other one hundred and seventy districts in the city.

The sanitary condition of dairies and stores is best recorded by means of the score card system, whereby a dairy receives a certain mark according to its points of merit, one hundred for perfection being used as a basis for scoring.

Of the cities replying to the questions, sixty-three per cent. use score cards for dairy farms, thirty-five per cent. use them for local dairy depots and stores, and thirty per cent. use them for all inspections. Two cities use them for local dairies but not for stores, and one city uses them for stores but not for dairies.

The score card probably was first introduced by Dr. William C. Woodward, health officer of the District of Columbia, January 9, 1904. Professor R. A. Pearson presented a somewhat different form of score card February 25, 1905. Later, the Bureau of Animal Industry, Dairy Division, of the U. S. Department of Agriculture, after a thorough investigation of the merits of the score card system, prepared a score card July 1, 1906, and it is due to the efforts of this bureau that the score card is so widely used. Probably the best score card is the one adopted at the last meeting of the Official Dairy Instructors' Association. This card is self explanatory, is applicable to all sections of the country, and its adoption by all dairy inspectors would effect the much desired uniformity in scoring by this method. The fact that the average score attained in different cities varies from 41.1 per cent. to 95.0 per cent. indicates either that there is a wide range in the sanitary requirements of the cities represented, or that uniformity in scoring by this method is deplorably lacking. Score cards and reports may be filed conveniently by numbers, the numbers being written on the name and street cards. This keeps all reports on a particular place together, and the name cards may be conveniently consulted for all information other than the sanitary condition of a dairy or store.

COLLECTING SAMPLES AND RECORDING RESULTS.

Samples for chemical analysis may be collected conveniently in cork stoppered bottles holding about 60 cc. Except in rare cases, this amount of milk is sufficient for the routine examinations. The bottles either should be numbered or have identification tags attached. A good plan is to have metal number tags wired to the necks of the bottles; these tags can be removed in case the bottles break.

The inspector, when collecting a sample, fills out a card with all necessary data, including the temperature and specific gravity of the milk, the place and time at which the sample is taken, and the number of the bottle containing the sample. These cards have spaces for entering the results of the analysis, and after this is completed, the cards may be filed for reference without further clerical work. With sets of guide cards containing a list of the names of milk shippers and a list of the names of local dairymen, all of the analysis cards of one person may be filed together. A convenient size of sample card measures three and one-half by six inches, and of guide card four by six inches.

Samples for bacteriological examination should be taken in glass stoppered bottles. An arrangement proposed by Dr. Wm. Bissell, of Buffalo, and somewhat modified by the writer, has been satisfactorily used in Baltimore for some time in collecting these samples. A light copper wire about thirty inches long is fastened to the stopper and neck of the bottle and wound in an even coil around the neck. Sheets of ordinary white letter paper, measuring about nine by twelve inches, are cut in halves to form pieces about nine by six inches. One piece of paper is wrapped around the lower part of a bottle so as to reach to the shoulder. Another piece is wrapped around the remaining part so that all of the bottle is protected. The bottles are then sterilized at one hundred and forty degrees (centigrade) for one hour. In collecting the samples the cans are well shaken to mix the cream and milk as thoroughly as possible. The top outer wrapper of a bottle is slid off, the stopper removed, the bottle withdrawn by the wire from the remaining wrapper, and immersed into the milk without having come in contact with anything outside of the paper wrappers. Samples taken in this manner are a little high in butter fat, and therefore cannot be used for chemical examination.

In an effort to improve the quality of the market milk of Baltimore, a number of schemes have been tried, some of which will be briefly described. When a sample of milk, obtained at a railroad station, is found to be below the legal requirement in butter fat, the shipper is notified that unless he raises the butter fat content of the milk to at least three and one-half per cent., the legal standard, the person to whom it is consigned will be notified of its poor quality. Provision is made to secure additional samples of the milk from the same shipper a week or so later, and if they, or any other samples from that shipper, are again below grade, the consignee is notified, and advised that if he should offer for sale milk of this quality he would be liable to prosecution. When a sample of milk shows a high bacterial count, an excessive number of streptococci and pus cells, or the presence of the colon bacillus, the producer is notified, an explanation of the

terms used, together with a brief outline of principles to be observed to correct the matter, being embodied in the notice. Additional samples are obtained from the same shippers whose milk showed a bad record, and the various data collected in this manner will be used in efforts to secure additional legislation and more adequate means for the supervision of the dairy farms. Especially is it desirable to establish a maximum bacterial standard. The data at hand from the various cities show that about forty-three per cent. have ordinances or regulations providing for a maximum permissible bacterial count. Nine per cent. have a standard of 100,000; two per cent. have one of 300,000; two per cent. one of 400,000; and twenty-six per cent. one of 500,000 bacteria per cc.

When a sample of milk obtained from a local dealer is found to run low in butter fat, that dealer is notified by registered mail of the results of the analysis, and advised that unless he should improve the quality of the milk he offers for sale to such a degree that it contains at least three and one-half per cent. butter fat, he will be prosecuted. He is also informed that to assist him to correct the matter, analyses will be made of any samples he may care to bring to the department of health. A copy of the letter is kept on file for use as evidence in court to show that he had been previously warned of a violation of the law. At first, notices were sent out by ordinary mail, but they were seldom effective. Since we commenced registering these notices, the dairymen have almost invariably replied to them in person. This gives an opportunity to interview them and to secure their coöperation, which is one of the most effective aids in governing the situation. We also make it a point to secure samples at the railroad stations from all the shippers of a local dairyman whose milk may have been found below standard. If his milk continues below grade after he has been notified and advised which of his shippers may be furnishing him with poor milk, he is prosecuted without further notice, unless he may have changed his shippers or, in good faith, made other efforts to comply with the law.

METHODS OF TRANSPORTING AND DELIVERING MILK.

When milk is not bottled at the dairy farms, it should be shipped in large, substantially made and well-tinned cans. These cans should have a wide mouth so that they may be readily cleaned, and should have all seams well flooded with solder. The use of wooden plugs for tops, or the use of paper and rags to secure the tops, should be prohibited. The local dairymen should be compelled to rinse or cleanse the cans before returning them to the shippers.

Since the delivery of milk and cream in bulk exposes them to contamination by street dust it is better to deliver them in bottles, provided the bottles are properly washed and sterilized before being refilled. On the other hand, unless the sterilization of all bottles is compelled by regulation, and the regulation adequately enforced, and unless the return of bottles from houses where there are cases of communicable disease is prohibited, this method of handling milk and cream may frequently spread disease. When milk is delivered from wagons, the measures and dippers should be kept protected from street dust when not in actual use.

COMMUNICABLE DISEASES.

Local Cases—Eighty per cent. of the cities prohibit the sale of milk from dairies or stores upon the premises of which there exists a case of certain of the communicable diseases; six per cent. do not, and six per cent. did not answer the question. The principal diseases for which the sale of milk is suspended, are typhoid fever, scarlet fever, diphtheria and tuberculosis. That no one coming in contact with a case of any of these diseases should be permitted to sell or handle milk is unquestionable, and the only certain means of preventing this is to either prohibit the sale of milk from the infected premises or to remove the patient suffering with the disease. Most cities possessing milk ordinances require milk dealers and producers to report cases of communicable disease on their premises; but it has been our experience that such cases are seldom reported, and that when legal proceedings are instituted against a violator of this requirement, the charge is generally dismissed on the plea of the defendant that he had not been definitely informed of the character of the disease. The best plan is to consult the records of cases reported by physicians to the board of health, and to compare them with the street list of persons engaged in the handling of milk, and with a list of the persons employed in handling milk for the larger dairies.

Cases on Dairy Farms—Cases of infectious disease throughout the state are reported to the state board of health. A list of these cases should be obtained from the department and compared with a list of the persons shipping milk to the city. This is only partly satisfactory because some district health officers report such cases only about once a month. Another plan is to secure each day a list of the positive specimens of throat cultures, sputum, and Widal tests and use them in locating cases of diphtheria, tuberculosis and typhoid fever.

DISEASE IN HOUSES WHERE MILK IS DELIVERED IN BOTTLES.

Where there are health wardens who investigate cases of communicable disease, they report the dairymen who serve milk to infected families.

These dairymen should be notified not to remove any bottles from infected houses until all danger of spreading disease by doing so is over. The report of the attending physician, or the removal of the placard in posted cases indicates that bottles may be taken away.

The danger of the spread of disease through the agency of infected milk bottles is well recognized. Even when bottles are sterilized before being refilled, there is still some danger that they may be infected before reaching the milk consumer if the removal of milk bottles from premises harboring cases of diphtheria, typhoid fever, scarlet fever and tuberculosis, is not prohibited; for in the course of handling such bottles the fingers of the driver may become infected and may transfer the germs of any of these diseases to the full bottles as he carries them about. All milk bottles should, of course, be sterilized, for there undoubtedly occur many mild or atypical cases of disease which are never reported to the department of health. Despite the evident danger of the spread of disease in this manner, very few cities have ordinances prohibiting the removal of bottles from infected houses.

In connection with the dispatch of notices to the dairies, informing them of cases of communicable disease on their routes, there should be kept a list of these residences with the dates when the cases were reported. When the number of cases of certain diseases on a particular dairy route in a given time exceeds an established maximum, which can be set from a knowledge of the number of customers served, suspicion of a milk epidemic may be aroused. Unfortunately, the information derived in this manner is obtained almost too late to be of much value, but it is at least worthy of consideration. Since the beginning of the use of this record in Baltimore, about two years ago, several milk epidemics have been discovered in this manner.

BOVINE TUBERCULOSIS.

Thirty-five per cent. of the cities require cows to be tuberculin tested, and fifty-five per cent. do not; one city expects to require this test, one city requires that the milk either be procured from tested cows or be pasteurized, and four cities did not answer the question.

In the light of recent knowledge it seems unnecessary to dwell upon the necessity of immediate and unceasing efforts to exclude tuberculosis infected milk from the public supply. This will only be accomplished by the elimination of all tuberculous cattle from the herds or by the pasteurization of all milk from untested cows.

SUPERVISION OF DAIRY FARMS.

Eighty per cent. of the cities have supervision of the dairy farms, seventeen per cent. have not, one city has a supervision within a radius of half a mile from the city limits, and one city did not answer the question. It is probable that in many cases the supervision of the dairy farms is provided for in an ordinance requiring that the milk be produced under sanitary conditions, the authorities assuming the right to examine the sources of supply where insanitary conditions are suspected.

THE USE OF REFRIGERATOR CARS FOR THE TRANSPORTATION OF MILK.

About thirty per cent. of the cities receive milk in refrigerator cars, fifty per cent. do not, and twenty per cent. did not answer the question. Under proper conditions, the use of refrigerator cars is, of course, desirable.

A special investigation of the conditions under which milk is hauled to Baltimore was undertaken last summer. Temperatures of seventy-nine shipments of milk were taken as soon as the milk was loaded on the cars, and again when the train had reached the city. No means of cooling the cars or the milk was provided, and the temperature of the cars ranged from sixty-nine to seventy-one degrees Fahrenheit. The time occupied in bringing milk from the farthest shipping station was two hours and fifteen minutes. A summary of the results follows:

	Railroad A	Railroad B	Railroad C
Temperature of car	71°	70°–71°	69°–71°
Time of first temperature	6:25 A. M.	6:30 A. M.	6:45 A. M.
Time of final temperature	8:40–9:00	8:45–9:00	8:10–8:25
Average initial temperature	64.7°	59.6°	62.2°
Average final temperature	66.5°	62.8°	64.1°
Average rise in temperature	1.8°	3.9°	2.4°
Maximum initial temperature	86.5°	75.2°	77.0°
Maximum final temperature	82.5°	73.0°	76.0°
Minimum initial temperature	46.0°	44.7°	58.0°
Minimum final temperature	54.5°	52.0°	61.0°
Maximum rise in temperature	8.5°	7.3°	4.0°
Minimum rise in temperature	—4.0°	—2.2°	—5.0°

The shipments showing the maximum initial temperatures had also the maximum final temperatures, as would be expected, and showed the minimum rise in temperature, this being in each case a negative quantity, i. e., the milk became cooler, since the original temperature was higher than that of the car and of the surrounding cans. Likewise, the shipments showing the minimum initial temperatures had also the minimum final temperatures, and showed the maximum rise in temperature.

Population. Over—	Supervision of dairy farms	Tuberculin test required	Score cards used for dairy farms	Score cards used for dairy depots and stores	Permits required for sale of milk	Daily consumption of milk and cream in gallons	Dairy depots where milk and cream are sold	Stores where milk and cream are sold	How often dairies and stores are inspected	Average score attained	Sale of milk prohibited on account of a case of communicable disease	Minimum butter fat standard for milk	Minimum butter fat standard for cream	Refrigerator cars used on railroads	Permits required for sale of ice cream	Persons employed in supervision of milk supply
500,000	yes	no	yes	yes	yes	23,000	380	2,800	6 wks.	74	yes	3.5	none	no	no	17
"	yes	yes	yes	yes	yes	240,480	16,000	2,600	3–6 mo.	77	yes	3.0	15	yes	yes	50
"	no	no	....	yes	yes	20,000	....	....	....	....	yes	3.0	12	no	no	
"	yes	no	yes	yes	yes	450,000	450	12,500	1 mo.	....	yes	3.0	15	yes	no	80
"	no	no	no	no	yes	62,500	6	3,800	....	....	yes	3.35	15	yes	no	10
300,000	yes	no	yes	yes	yes	30,000	46	750	1–6 mo.	....	no	3.0	none	no	no	20
"	yes	no	yes	yes	yes	....	....	139	1 mo.	75	yes	3.4	18	no	no	6
"	yes	no	yes	yes	yes	90,000	500	2,000	1 mo.	61	yes	3.0	none	no	yes	32
"	yes	yes	no	no	yes	25,000	1,050	850	3 mo.	....	yesE	3.0	18	no	no	11
"	yes	no	yes	yes	yes	17,000	59	12,000	8–9 da.	75	yesE	3.5	20	no	no	18
"	yes	yes	....	......	yes	....	....	....	....	....	yesE	3.5	......	....	....	....
200,000	yes	yes	yes	yes	yes	....	25	250	....	68	yesE	3.25	......	yes	yes	....
"	yes	no	yes	yes	yes	16,800	14	10,342	4 mo.	48	yes	3.6	18	no	....	8
"	yes	no	no	no	yes	....	40	250	1 yr.	....	yes	......	16	yes	no	1
"	yes	....	yes	yes	yes	20,000	300	1,200	1–4 mo.	....	yes	2.5	......	yes	no	5
100,000	yes	no	yes	yes	yes	20,000	163	500	6 mo.	41	yes	3.0	none	no	no	5
"	yes	no	yes	no	yes	15,000	20	600	1–3 mo.	55	yes	3.0	16	no	yes	7
"	no	yes	no	no	yes	25,000	18	380	3 mo.	....	yes	3.5	20	no	no	5
"	yes	no	no	no	yes	7,000	15	273	1 da....	....	yes	3.0	......	yes	yes	2
"	yes	no	yes	......	yes	55,000	5	150	....	68	yesE	3.0	20	no	yes	7
"	yes	yes	yes	no	yes	7,000	1	435	....	....	yesE	3.5	......	....	no	5
"	yes	no	no	no	yes	10,000	....	....	....	....	......	3.25	......	yes	no	3
"	yes	....	no	no	yes	....	75	300	....	....	......	......	......	....	yes	5
"	yes	no	yes	no	yes	10,000	3	500	....	....	yes	3.35	15	yes	yes	7
"	yes	no	yes	no	yes	15,000	....	198	1 mo.	75	yes	......	......	no	yes	10
"	yes	no	yes	no	yes	....	....	65	....	....	yes	3.25	18	yes	yes	1
"	no	no	yes	no	yes	20,000	11	600	....	70	yes	3.5	18	no	no	13
50,000	yes	no	yes	yes	yes	15,000	40	250	3 mo.	67	yes	3.25	18	....	no	5
"	yes	no	yes	yes	yes	6,000	40	....	....	47	yes	3.6	20	no	no	4
"	yes	no	yes	no	yes	5,000	2	....	....	75	yes	3.0	none	no	yes	5
"	no	no	no	no	yes	4,700	47	228	3 mo.	....	no	3,0	15	no	no	1
"	yes	yes	yes	yes	yes	70,000	18	850	6 mo.	....	yes	3.0	14	no	yes	6
"	....	....	....	......	yes	8,000	1 ,000	350	1 mo.	....	yes	3.0	......	yes	....	....
"	yes	no	yes	no	yes	15,000	19	384	4 mo.	60	yes	3.35	15	yes	no	2
"	no	no	no	no	no	20,000	6	....	....	....	yes	3.0	......	yes	no	4
"	yes	no	yes	yes	yes	6,159	88	133	3 da.	77	yes	3.0	16	no	yes	2
"	yes	yes	yes	yes	yes	....	4	250	....	....	yes	......	......	yes	yes	2
"	yes	yes	yes	yes	yes	....	6	192	2 mo.	....	yes	3.5	14	....	yes	5
"	yes	no	yes	......	yes	4,500	....	200	1 wk.	....	yes	3.35	15	....	no	2
"	yes	yes	yes	yes	yes	4,000	6	....	1 mo.	....	yes	3.2	18	no	no	1
"	no	....	no	no	yes	300	82	15	1 wk.	....	yes	......	......	no	no	....
"	yes	yes	no	no	yes	15,000	4	50	1 mo.	....	yes	3.3	20	no	no	10
"	yes	yes	no	no	yes	9,000	7	56	3 mo.	....	yes	3.0	none	no	no	3
40,000	yes	yes	yes	no	yes	....	1	35	1 mo.	79	yes	3.0	......	no	no	2
"	yes	no	no	no	yes	3,926	12	45	1 mo.	....	no	3.5	18	no	no	4
"	yes	yes	yes	no	yes	6,000	6	....	1 mo.	....	yes	3.0	18	no	no	5
"	yes	yes	yes	no	yes	2,500	....	....	2 mo.	....	no	3.5	25	no	no	2
"	yes	yes	no	no	yes	2,500	1	100	1 wk.	....	yes	3 to 4	26to30	no	yes	3
"	yes	yes	yes	yes	yes	2,000	1	75	1 mo.	95	yes	3.5	none	no	yes	2
"	yes	yes	yes	yes	yes	4,000	9	100	3 mo.	55	yes	3.25	18	....	no	3
"	no	no	yes	no	no	12,000	11	35	....	60	yes	......	......	yes	no	1
30,000	yes	no	no	no	yes	500	3	....	....	....	yes	3.0	12	no	yes	....
"	yes	no	yts	yesY	yes	3,500	....	102	1 mo.	....	yes	3.35	15	....	yes	4
"	yes	no	no	no	yes	500	8	175	....	....	yes	3.35	15	yes	yes	2
"	yes	yes	no	no	yes	2,000	2	20	....	....	yes	3.0	18	no	no	3
"	....	no	no	no	no	....	2	75	1 wk.	....	yes	3.0	12	no	no	5
"	yes	no	yes	no	yes	....	2	10	....	....	yes	3.0	......	yes	no	....
"	yes	yes	no	no	yes	1793	1	207	2 mo.	....	yes	3.35	15	yes	no	2
20,000	yes	yes	yes	yes	yes	....	2	65	....	60	yes	......	......	yes	no	3
"	yes	no	yes	no	yes	1,250	....	18	1 yr.	54	yes	......	18	yes	no	2
"	yes	no	no	no	yes	2,000	2	....	2 wk.	....	yes	3.25	18	....	yes	2
"	yes	yes	yes	yes	no	1,280	2	3	1 mo.	83	yes	......	16	....	yes	1
"	yes	yes	yes	no	yes	....	10	27	4 mo.	....	yes	3.25	18	yes	no	1

The cans were closely packed in the car, and the temperature of the car had, in most cases, but little effect upon the temperature of the milk.

There should be, of course, a maximum temperature standard, but this standard can be enforced only gradually at first, otherwise, for a while there would likely be a milk famine. Until the producers can be compelled to properly cool their milk before shipment, the railroad officials can hardly be expected to recognize the importance of the need of refrigerator cars, and unless provision be made for the supervision of the milk before shipment, the use of refrigerator cars is likely to shift upon the railroad companies the burden of cooling much of the milk.

Fifty-six per cent. of the cities have maximum temperature standards, as follows: two per cent. have a standard of 50° F., eight per cent. have one of 55° F., eleven per cent. one of 60° F., two per cent. one of 65° F., and two per cent. one of 70° Fahrenheit.

BUTTER FAT STANDARDS.

Nearly all of the cities have a maximum butter fat standard for milk, and about seventy per cent. have a minimum butter fat standard for cream. The butter fat standard for milk varies from 2.5 per cent. to 3.6 per cent., but only one city has a standard of less than 3.0 per cent. One city has two standards, 3.0 per cent for the winter months, and 4.0 per cent. for the summer months. Thirty-seven per cent. have a standard of 3.0 per cent., thirteen per cent. have one of 3.25 per cent., fourteen per cent. one of 3.35 per cent., nineteen per cent. one of 3.5 per cent., and three per cent. one of 3.6 per cent. Several cities operate under state milk laws, and are not included in the above enumeration. The standards for cream vary from 12 per cent. to 25 per cent. butter fat. Five per cent. of the cities have a standard of 12 per cent., three per cent. have one of 14 per cent., seventeen per cent. one of 15 per cent., six per cent. one of 16 per cent., twenty-one per cent. one of 18 per cent., eight per cent. one of 20 per cent., and two per cent. one of 25 per cent.

From the facts set forth, it may be seen that while many admirable methods are used by various authorities in the administrative control of the milk supply, there is little or no standardization of these methods. Therefore, it seems advisable to have some representative society or body appoint a committee to recommend or establish practical standard methods that would be capable of universal use.

THE ANTI-RABIC INSTITUTE OF THE BOARD OF HEALTH OF GUADALAJARA.

By Dr. FERNANDO BAUDA,
Guadalajara, Mexico.

The results obtained in the Anti-Rabic Institute of the Jalisco Board of Health, from the date of its establishment to the present day, are, it seems to me, of sufficient importance and genuine interest to the public to justify a careful study.

Cases of people bitten by mad dogs who had to be sent hundreds of miles to Mexico City for Pasteur treatment were altogether too frequent, and the urgent need of establishing a special and local anti-rabic institute in the capital of the state became evident to the state government. To this end Doctors Oliva and Toral were commissioned and sent to Mexico City that they might be made immune, and on their return they brought with them the marrow of rabid rabbits, and other necessary materials for the Institute. Several rabbits were inoculated, and shortly afterwards various emulsions were prepared and made ready for emergencies. August 7, 1902, a man bitten by a mad dog was treated, and the treatment was successful. Since that date the Anti-Rabic Institute has been in actual and continuous service.

The specific methods used by us may be but little different from the classic methods of treatment, but for the sake of clearness and completeness they are briefly outlined here.

When an injected rabbit dies, its spinal cord is removed and kept in two different divisions, viz.: the bulb, which is used for the next rabbit inoculation, and the medula, which is used for preparing emulsions for individual treatment of patients. The medula is dried in test tubes over caustic potash, and a good supply is always kept on hand.

Emulsions are prepared as usual; that is, a piece of marrow is placed in a sterilized mortar with enough liquid, and ground until emulsion is perfect.

The treatment is given in two entirely different ways. One treatment, called "simple treatment" is used for patients who have been bitten shortly before the injection, and whose wounds are far removed from nervous centers; this first method is also used every six months

for making immune those practitioners who work in the laboratory. The other method, "the intensive or double series treatment," is used when many days have elapsed since the patient has been bitten, or when the wound is serious and happens to be on the neck, face, or head.

The simple treatment consists of three series of two daily injections in the following manner:

FIRST SERIES.

DAYS	MORNING	AFTERNOON
1st day	Emulsion No. 9	Emulsion No. 8
2nd day	" 7	" 6
3rd day	" 5	" 4
4th day	" 3	" 2

SECOND SERIES.

5th day	Emulsion No. 9	Emulsion No. 8
6th day	" 7	" 6
7th day	" 5	" 4
8th day	" 3	" 2

THIRD SERIES.

9th day	Emulsion No. 8	Emulsion No. 6
10th day	" 4	" 3
11th day	" 2	" 4
12th day	" 3	" 2

In the table, the number of each emulsion indicates the number of days the marrow has been subjected to the drying action of caustic potash

In the "double treatment" patients are injected four times per day, twice in the morning and twice in the afternoon, as follows:

FIRST SERIES.

1st day	Emulsion No. 9—8	Emulsion No. 7—6
2nd day	" 5—4	" 3—2

SECOND SERIES.

3rd day	Emulsion No. 9—8	Emulsion No. 7—6
4th day	" 5—4	" 3—2

THIRD SERIES.

5th day	Emulsion No. 8—6	Emulsion No. 4—3
6th day	" 2—4	" 3—2

The intensive treatment is used in the greatest number of cases, as it proves to be the safest and the most effective, and has apparently no ill effects.

The following results have been obtained: From August 7, 1902, to July 30, 1910, 845 persons have been injected in the State Anti-Rabic Institute, as follows:

From August 7th, 1902 to January, 1903	27	cases
January, 1903, to January, 1904	46	"
January, 1904, to January, 1905	75	"
January, 1905, to January, 1906	55	"
January, 1906, to January, 1907	65	"
January, 1907, to January, 1908	71	"
January, 1908, to January, 1909	120	"
January, 1909, to January, 1910	271	"
January, 1910, to July, 1910	115	"
Total number of cases	845	

Of these 845 patients, 7 stopped treatment and 7 died of rabies, that is to say, there was .80 per cent mortality.

In the whole Republic of Mexico, where there are many conditions favorable to the spreading of rabies among the too numerous dogs in the city and in the country, it will be next to impossible to exterminate it, as has been done in Denmark, Sweden, and Norway, where no case has been seen in fifty years, and in England also, where the enforced muzzling of all dogs since the year 1905 has resulted in the complete disappearance of the disease.

From what is generally known with reference to the treatment of rabies, it would appear from the foregoing statistics of the Guadalajara Anti-Rabic Institute that the results obtained have been thoroughly satisfactory.

Laboratory Section

METHODS OF COLLECTION, TRANSMISSION AND RECORD IN THE ROUTINE EXAMINATION OF SPINAL FLUIDS.

By A. J. CHESLEY, M. D.,
Laboratory Minnesota State Board of Health.

The occasional specimens of spinal fluid examined previous to 1908 by the Minnesota State Board of Health Laboratory staff were collected by experts in specially prepared outfits. Such specimens were satisfactory, but the demand for the examination of spinal fluid has increased, and specimens collected by general practitioners frequently have been unsatisfactory.

During 1908 and 1909, seventy specimens of spinal fluid taken from fifty patients were examined. Only four cases of epidemic cerebro-spinal meningitis were discovered. Two were of the fulminating type and died, each having received one 15 cc. injection of Flexner's anti-meningitis serum a few hours before death. The other two patients recovered under serum treatment.

Between January 1 and August 1, 1910, thirty specimens of spinal fluid from eleven patients were examined. In the specimens from four patients Weichselbaum's diplococcus was demonstrated by smears and cultures. These cases were treated with Flexner's serum. One made a rapid and complete recovery. Another recovered after a long illness but is entirely blind. The other two patients died and complete post mortem examinations were made.

Spinal fluids from twenty-one cases of epidemic poliomyelitis were examined also in 1909. A bacteriological study of these fluids was made and some experimental work was done.*

Although these examinations were valuable as an aid to correct diagnosis and were of scientific interest, they clearly pointed out the absolute necessity for specific directions, special collection outfits, and data sheets, if such examinations were to be made part of routine public health laboratory work.

The present outfit, mailed to physicians upon request, is packed in the mailing case ordinarily used for diphtheria outfits. It consists of a sterile collection bottle; two 15 cc. bottles of Flexner's serum; "Directions for Collection of Cerebro-spinal Fluid;" a "Spinal Fluid Data" sheet; a letter

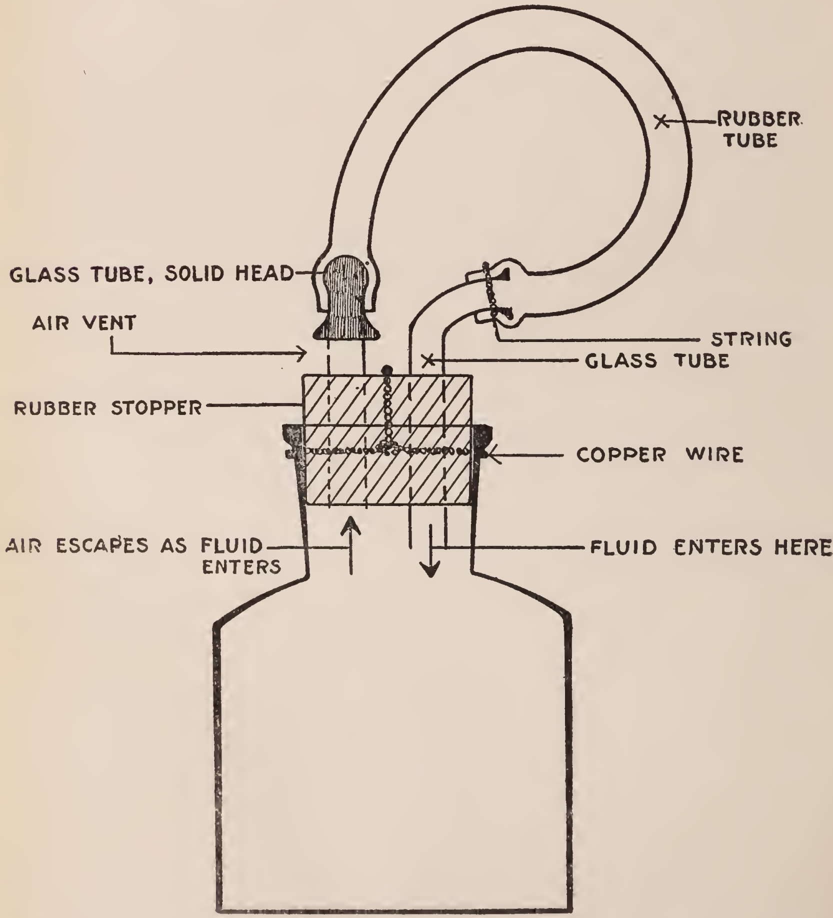
* Pathology and Bacteriology of Acute Anterior Poliomyelitis, by H. E. Robertson, M. D. and A. J. Chesley, M. D. (Archives of Internal Medicine, Sept., 1910, Vol. 6).

of special instructions and advice to the attending physician from the Director of the Laboratory Division; direction for treatment of epidemic cerebro-spinal meningitis, which include Dr. C. H. Dunn's "Summary of the Method of Employing the Anti-meningitis Serum"*; an abstract discussion in the British Medical Journal of October 31, 1908, *re* washing out pus from the spinal canal with normal saline solution, from Dr. Robb, and a note *re* the administration of hexamethylenamin,†

The sketches illustrate the use of the spinal fluid collection bottle.

SPINAL FLUID COLLECTION BOTTLE.

I.



Sketch showing bottle after removal of cloth hood. Air vent is open.

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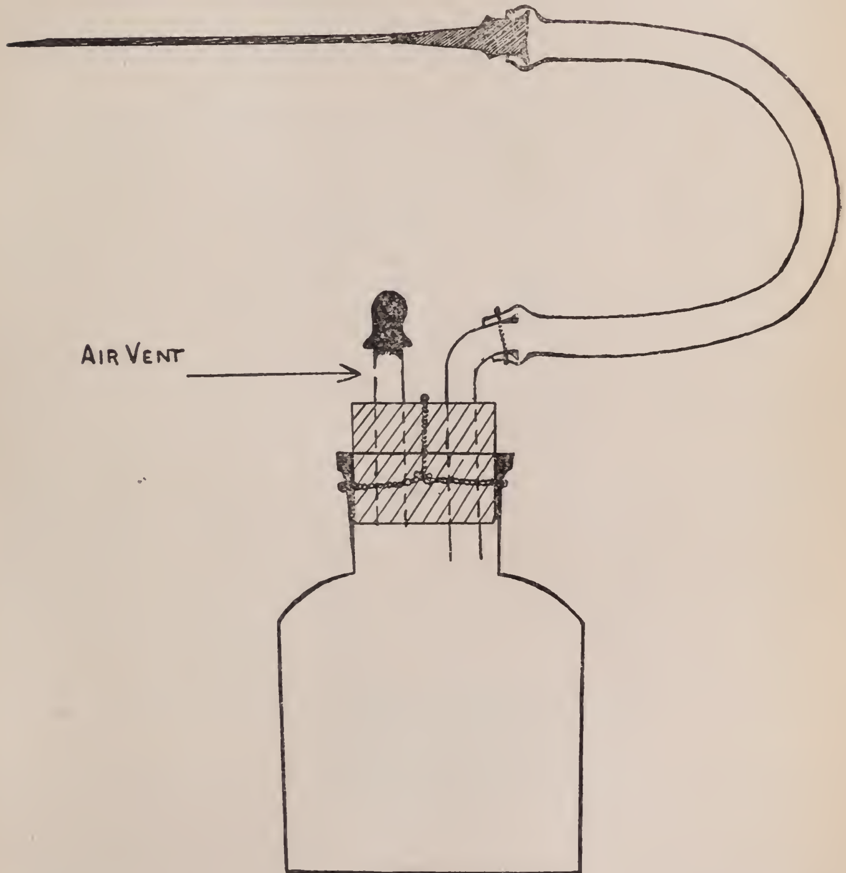
* Boston Medical and Surgical Journal, 1908, clix, 843.
† Johns Hopkins Hospital Bulletin, Vol. XX, No. 217, page 102

SPINAL FLUID COLLECTION BOTTLE.

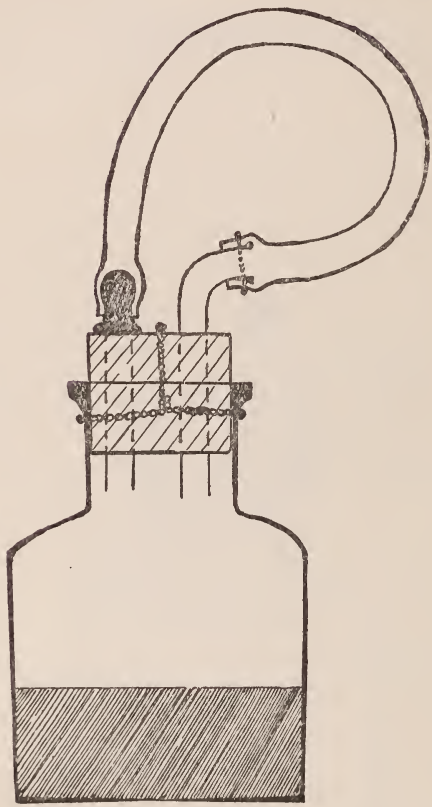
II.



Sketch showing the connection with the needle after its introduction into the spinal canal.

SPINAL FLUID COLLECTION BOTTLE.

III.



Bottle after collection of spinal fluid. First, the air vent is closed by pushing tube into rubber stopper, then the end of rubber tubing is slipped over the solid knob of the tube and cloth hood replaced and tied to protect the tubes during transit.

Following are the forms used in connection with this work:

DIRECTIONS FOR COLLECTION OF CEREBRO-SPINAL FLUID.

1. To Sterilize Syringe: Boil for six minutes a large syringe and two spinal needles with obturators inside.

2. To Warm Serum and Salt Solution to Body Temperature: Pour some of the hot water into another dish and add cold water until temperature is 105° F. to 110° F. by your clinical thermometer. Into this water, which should be about 1 inch deep, set the salt solution and serum bottles. Do not allow the necks or stoppers of serum bottles to get wet.

3. To Prepare Specimen Bottle: Untie string holding cloth hood and remove cloth. Do not disturb the rubber tubing or the stopper. The bottle is now ready for use (See No. 6) if the vertical glass tube shows a mark just above the stopper. This mark defines the level of the air vent on one side of this tube, and if it is not in sight, gently pull the tube out until the mark just shows.

4. To Prepare Patient: Place patient on one side with back curved to separate spines of vertebrae. Count spinous processes and clean skin between 2nd and 5th lumbar vertebrae with 5% phenol followed by alcohol. Give local or general anesthetic if necessary.

5. To Make Lumbar Puncture: Insert needle about ½-inch to one side the median line midway between the 3d and 4th lumbar spines, slanting needle slightly upward and toward the median line so the point will cross it when needle has been inserted about 1¾ inches. If bone is struck, withdraw needle and try again a little to one side. A cessation of resistance when needle is inserted about 1½ to 3 inches (according to patient's age) marks its entrance into the canal.

6. To Collect Fluid: Remove obturator from needle *in situ*. (If fluid is too thick to flow through the needle, fill syringe with sterile physiological salt solution as directed under 7 and 8 and inject to wash out and thin the pus.) Take specimen bottle in left hand. Hold stopper and vertical tube between thumb and finger and pull off untied end of rubber tubing. Slip this end of tubing over needle and allow spinal fluid to flow directly into sterile bottle, thus avoiding danger of contamination through exposure to air, etc. When flow ceases or the bottle is filled, carefully pull tubing off needle and fit it over the end of vertical tube as you found it. Push the tube into the stopper as far as it will go. This buries the air vent in the stopper and prevents leakage during transit. The cloth hood should now be tied securely over all.

7. To Fill Syringe With Serum or Salt Solution: Remove obturator from extra needle and fit needle to syringe. Carefully remove stopper from bottle and fill syringe directly from bottle without touching its mouth or neck.

8. To Inject Serum or Salt Solution: Disconnect needle and fit filled syringe to needle inserted in spinal canal and inject slowly.

9. To Dress Puncture Wound: After withdrawing needle, seal the wound with collodion dressing.

10. Fill Out Without Delay all the blanks enclosed and forward with the specimen to

The Director of the Laboratory Division,
Minnesota State Board of Health,
University Campus,
Minneapolis, Minn.

SPINAL FLUID DATA
LABORATORY DIVISION, MINNESOTA STATE BOARD OF HEALTH
University Campus, Minneapolis.

Patient's Name .... Age.................. Sex ....

*Township
Village Residence.. Co. ....
City

P. O. Address...................................Occupation ....

This illness began on .... 19...., with symptoms as follows..........................
date

....

....

....

.... up to date.

What previous sickness or injury has the patient had which may have some relation to this attack?..........

Present condition...........................19..... General development.................................
date

Nutritional condition ....

Posture in bed...

Eruption; character and extent...

....

Temp. .... Pulse .... Resp...

Mental condition ....

Sensory disturbances ....

....

Pain and tenderness; character and location..

Motor disturbances and paralysis ....

....

Bladder .... Rectum ....

Convulsions; ...., character and duration.......................................

....

Muscular rigidity ....

Reflexes: Pupil...

Knee..

Ankle ....

Babinski..

Kernig..

Leucocyte count...............................Differential count ....

Lumbar puncture made under *local / general / no anesthetic at ....*a. m. / p. m. ....19.... by
date

Dr. ....

About..........cc. of............*clear / cloudy / bloody spinal fluid, flowing under.................................

pressure, was drawn directly into...

Describe effect of lumbar puncture. ....

....

GIVE NAMES AND AGES OF PERSONS IN SAME HOUSE WITH PATIENT.

....

....

....

Remarks on this or similar cases in vicinity..

....

Clinical diagnosis ....Physician......................................

Address...

* Strike out words or letters that do not apply.

ADDITIONAL DATA FOR CASE RECEIVING ANTI-MENINGITIS SERUM TREATMENT.*

Can every requirement of the letter concerning the use of Flexner's serum be carried out? ....

....

Amount of serum injected today = ... cc.

Send .... cc. of Flexner's serum and spinal fluid collection outfit to Dr. ....

by mail or by ....Express Co for treatment of this case.

(FOR LABORATORY USE ONLY.)

Specimen received .... by ....

Smears directly from fluid..

....

Smears from sediment after centrifugalization ....

....

....

Cultures ....

....

....

Animal inoculation ....

....

....

....

Findings, bacteriological..

pathological ....

....

(* Reverse spinal fluid circular.)

LABORATORY DIVISION, MINNESOTA STATE BOARD OF HEALTH,

University Campus, Minneapolis, Minn.

DEAR DOCTOR:*

Since the serum treatment of meningitis is still in the experimental stage, and on account of the difficulty in preparation and limited amount of serum available, Dr. Flexner permits its use only under the following conditions which must be accepted by all concerned before beginning serum treatment.

The patient's family or friends, the attending physician, and the laboratory staff, must co-operate and assist one another in every way to insure a thorough scientific study of the case, not only for the successful treatment of this patient, but also that other patients in the future may receive the benefit derived from the study of this case.

The patient's family must assist in the observation of the case and permit a post mortem examination to be made by the attending physician and a member of the laboratory staff, if the patient dies.

The attending physician must make a full report on the clinical symptoms and treatment throughout the course of the disease. This report should include differential blood counts before and about twelve hours after each serum treatment as well as careful observation and comments upon the effect of the serum. He is also required to fill out the data blanks attached to the serum and specimen bottles and forward the empty bottles and the specimen of cerebro-spinal fluid to the laboratory without delay.

The laboratory will issue serum, and sterile specimen bottles, with detailed instructions for the use of the serum and collection of the specimen; will make microscopic and cultural examination of every specimen of cerebro-spinal fluid received and report results to attending physicians; if the patient dies, will furnish a pathologist with proper equipment for autopsy; finally, will send a complete report of the case to Dr. Flexner, omitting the patient's name.

The acceptance of the serum implies that all parties agree to carry out the above requirements.

Yours very truly,

F. F. WESBROOK, Director.

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* This letter is sent only when Flexner's serum is too be used.

A RESUME OF DIPHTHERIA EXAMINATIONS MADE IN THE BOSTON BOARD OF HEALTH BACTERIOLOGICAL LABORATORY IN 1909.

By FRANCIS H. SLACK, M. D.*

During the year 1909 there were examined in the Boston Board of Health Bacteriological Laboratory 28,557 diphtheria cultures; 20,324 of these being in the course of the regular routine of the laboratory and 8,233 on special investigative work in relation to the presence of "diphtheria bacillus carriers" among children in the public schools.† An average of about twenty-two cultures were examined for each of 936 different physicians who availed themselves of the opportunities offered for diphtheria diagnosis.

ROUTINE EXAMINATIONS.

TABLE I.
Showing Routine Cultures Classified.

	Positive	Negative	No Growth	Total
Primary........	1668	10,784	93	12,545
Secondary........	1957	5,774	48	7,779
	3625	16,558	141	20,324
	18%	81%	.1%	

Perhaps the most striking feature of this table is the large number of primary negatives, more than half the total tests. This is an indication of the general use of the laboratory in cases where there is the slightest suspicion of diphtheria, in many cases cultures being made more for the purpose of excluding possible diphtheria than from any belief in its presence. Physicians who are most familiar with clinical diphtheria freely confess their dependence on the laboratory for aid in diagnosis.

It is compulsory that diphtheria be reported to the Board of Health, and 2720 cases were reported during the year. Of these, the laboratory diagnosed 1858, or over 68 per cent., 1668 of these diagnoses being on primary cultures and the remainder secondary. For every 100 cases reported 747 examinations were made, 555 of these being for diagnosis and 192 for release. Cultures from 1059 different persons were examined, on an average, each month.

* Formerly Director, Boston Board of Health Laboratory.
† Journal A. M. A., March 19, 1910.

ISOLATION OF PATIENTS.

Diphtheria cases, when isolated at home, are kept in quarantine until two successive negative cultures, taken at least twenty-four hours apart, have been obtained. These release cultures must be taken from both nose and throat, the first to be taken by the attending physician and the second by a medical agent of the Board of Health. Cases sent to the city hospital are released by the hospital authorities, who make their own cultural tests.

TABLE II.

SHOWING NEGATIVE CULTURES OBTAINED FOR RELEASE, INCLUDING PREMATURE NEGATIVES. ALL WERE RELEASED ON TWO CONSECUTIVE NEGATIVES.

Month	Positive Cases Released on Two Negatives	Positive Cases Showing Premature Negatives	Per Cent. of Positive Cases Showing Premature Negatives
February, 1909	54	8	15
March	63	13	21
April	67	7	10
May	92	29	31
June	73	23	31
July	67	14	21
August	26	3	12
September	46	20	43
October	90	14	15
November	113	24	21
December	134	34	25
January, 1910	101	32	32
Total	926	221	24%

Column 1 shows total positive cases which were released on two consecutive negatives.

Column 2 shows the number of these which, during the taking of cultures for release, yielded a negative culture followed by a positive.

Column 3 shows that if release were granted on one negative culture only, 24 per cent. of the total positive cases released by the laboratory would still carry the bacilli after such release.

Since diphtheria is an acute bacterial disease, isolation of those suffering from it until they are free from the organisms seems the only logical procedure, if we are to protect others from infection. If by chance morphologically typical organisms are found in the secretions of the nose or the throat of a normal individual, we face an altogether different proposition, and it would be but fair, before rigorously quarantining such a person, to test the organisms for virulence, especially if there has been no known exposure.

It is fairly safe to assume that where a person has suffered from diphtheria and still carries the organisms in the throat or nasal secretions, when opportunity is offered these organisms will again produce the disease in a susceptible person; also that when a person recently exposed to the

disease is found to be a diphtheria bacillus carrier, though showing personally no symptoms of the disease, such a one is a menace to the health of others and should be isolated until he is free from the organisms or they are proved to be non-virulent.

DURATION OF DISEASE.

Our information as to the duration of cases is necessarily based on those cases which were both diagnosed and released by the laboratory.

TABLE III.

SHOWING AVERAGE LENGTH IN DAYS AND WEEKS FROM DATE OF FIRST POSITIVE TO SECOND NEGATIVE.

Month	No. of cases	Average in days	No. cases running less than 1 week	No. cases running between 1 and 2 weeks	No. cases running between 2 and 3 weeks	No. cases running more than 3 weeks
February, '09..	52	14.4	5	20	18	9
March.........	60	14.8	14	18	15	13
April...........	56	13.5	7	26	13	10
May...........	88	17.4	13	40	16	20
June...........	67	13.4	13	34	11	9
July...........	64	11.2	9	41	11	3
August.........	22	10.2	6	12	2	2
September.....	31	15.9	4	10	8	9
October........	75	12.4	16	33	16	10
November.....	102	15.5	17	45	20	20
December......	127	16.4	20	36	33	38
January, '10....	89	14.5	9	36	15	28
	833	14.6	133 or 16%	351 or 42%	178 or 21%	171 or 21%

The average duration of diphtheria cases was 14.6 days; 97 cases ran between three and four weeks, 34 between four and five weeks, and 40 over five weeks; the longest in duration was 73 days.

VIRULENCE TESTS.

As has been shown, there is a small percentage of cases where the bacilli persist for weeks and even months. In such cases, if the patient has fully recovered from his symptoms and is impatient to be at liberty, it is the custom, on request, to make virulence tests, releasing if the organism proves non-virulent, otherwise keeping the patient still in isolation. Of thirty-three such tests made during the year, eighteen were positive, twelve negative, and three showed slight virulence.

SWAB EXAMINATIONS AND SHORT INCUBATION TESTS.

It is our desire to return diagnoses to the physicians as quickly as possible. Examinations of swabs are made whenever requested, and all diagnosis cultures coming in before noon are placed in the incubator at

noon and examined about five o'clock. By these means many cases are diagnosed hours earlier than would otherwise be the case, and the patient has the benefit of a much earlier administration of antitoxin.

TABLE IV.

COMPARATIVE RESULTS FROM SWAB EXAMINATIONS AND SHORT INCUBATION AND OVER NIGHT INCUBATION RESULTS.

A

SWAB EXAMINATIONS AND OVER NIGHT INCUBATIONS.

	Positive Cases	Negative Cases
Swab + Culture +	143	0
Swab ? Culture +	26	0
Swab — Culture +	67	0
Swab — Culture —	9	588
Swab ? Culture —	1	36
Swab + Culture —	15	0
	254	631

B

SHORT INCUBATIONS AND OVER NIGHT INCUBATIONS.

	Positive Cases	Negative Cases
Short + Over night +	123	0
Short ? Over night +	15	0
Short — Over night +	23	0
Short — Over night —	9	593
Short ? Over night —	3	8
Short + Over night —	6	0
	179	601

Out of 885 swabs examined during the year, 740, or 83.6 per cent., were reported as the cultures proved. Of the remaining 145, 26 were reported suspicious and came positive, bringing the total of reliable results up to 86.5 per cent.

Unless a swab examination is positive, a final report is not given until after incubation of the culture. Sixty-seven of these cases showed nothing suspicious on the swabs but gave positive cultures. Fifteen cases, positive on the swab, were negative after incubation, either because the diphtheria organisms were overgrown in the cultures or because a second introduction of the swab for material for the examination reached foci not touched in swabbing for the culture.

Of the 780 short incubations made, 725, or 92.5 per cent., were reported as the longer incubation proved, the incubation in these cases being necessarily about five hours longer than usual. Fifteen were reported suspicious and came positive, bringing the total of reliable reports up to 94.8 per cent. Twenty-three, with a "probable negative" finding on the shorter, were positive on the longer incubation. Eleven, reported suspicious, were negative, although in three of these succeeding cultures were positive; six positive on the short incubation were overgrown on longer incuba-

tion. With all these preliminary examinations it is the custom to proceed with the regular incubation, and with the exception of the positive findings, final reports are not given until the results of the full incubation are known.

INFORMATION GIVEN BY THE PHYSICIAN.

The usual cards for information concerning the patient accompany each diphtheria outfit, and these, after the diagnosis is made and recorded, are kept on file in the laboratory for ready reference. Leaving out of consideration those cards submitted from schools and other public institutions, where many cultures are taken from normal persons to exclude diphtheria, we have a record for the year (1909) of 1529 primary positives and 7583 primary negatives.

SEX.

Of the positives, 710 are male and 819 female.

Of the negatives, 3417 are male and 4166 female.

AGE

TABLE V.

SHOWING AGE. POSITIVE AND NEGATIVE EXAMINATIONS.

POSITIVES

	Under 1	1–5	6–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	Not given
Male......	34	305	205	86	35	22	4	1				18
Female...	26	273	247	130	66	25	12	5	3			32
	60 4—%	578 37+%	452 29+%	216 14+%	101 6+%	47 3+%	16 1+%	6 $\frac{2}{5}$%	3 $\frac{1}{5}$%			50 3+%

NEGATIVES.

	Under 1	1–5	6–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	Not given
Male.....	241	1235	599	575	363	137	49	8	7	4	2	197
Female..	175	1144	692	798	684	283	93	41	14	2	2	238
	416 5½%	2379 31+%	1291 17+%	1373 18+%	1047 13+%	420 5+%	142 2—%	49	21	6	4	435 5$\frac{4}{5}$%

70 per cent. of the positives were in children under ten years of age, less than 4 per cent. being in those under one year, over 37 per cent. in children between one and five, and over 29 per cent. in children between five and ten. From five years up there is a noticeable preponderance of the disease in females, though under five years the males have a few more cases. The same is true in the negatives, which for the most part represent tonsilitis and similar infectious conditions. This is probably due to the closer association of the older girls and women with the sick.

DURATION OF SICKNESS BEFORE CULTURE WAS SUBMITTED.

TABLE VI.

POSITIVES.

	1st day of sickness	2d day	3d day	4th day	More than 4 days	Not given
Male.....	34	141	126	79	95	235
Female..	32	188	149	72	115	263
	66 4+%	329 21+%	275 18—%	151 10—%	210 14—%	498 32+%

NEGATIVES.

	1st day of sickness	2d day	3d day	4th day	More than 4 days	Not given
Male.....	120	597	659	308	558	1175
Female..	167	850	810	366	611	1362
	287 4—%	1447 19+%	1469 19+%	674 9—%	1169 15+%	2537 33+%

The majority of cultures are taken on the second and third days of illness, and it is probable that in most instances the physician is not called until the patient has been ill about this length of time. The parallel between the positive and negative tables is rather striking.

LOCATION FROM WHICH CULTURE WAS TAKEN.

TABLE VII.

POSITIVES.

	Nose	Throat	Nose and Throat	Not given
Male..............	76	388	171	75
Female...........	58	468	191	102
	134 9—%	856 56%	362 24—%	177 11+%

NEGATIVES.

	Nose	Throat	Nose and Throat	Not Given
Male..............	271	1991	779	376
Female...........	253	2492	1001	420
	524 7—%	4483 59+%	1780 23+%	796 10+%

Freak cultures, including thirty-three eye and twelve ear cultures negative, and four eye and four ear cultures positive, have been omitted from this tabulation.

PHYSICIANS' DIAGNOSES.

TABLE VIII.

POSITIVES.

	Diphtheria	? Diph	?	Croup	Tonsilitis	? Tons	Pharyngitis
Male...	160	51	36	8	107	10	5
Female	187	65	60	4	135	10	13
	347 23—%	116 7+%	96 6+%	12 1—%	242 16—%	20 1+%	18 1+%

	Laryngitis	Rhinitis	Other Diagnoses	Not Made
Male....................	5	9	32	287
Female..................	8	4	38	295
	13 1—%	13 1—%	70 5—%	582 38+%

NEGATIVES.

	Diphtheria	? Diph	?	Croup	Tonsilitis	? Tons	Pharyngitis
Male...	124	110	201	27	873	68	61
Female	168	169	225	19	1301	105	89
	292 4—%	279 4—%	426 5+%	46 1—%	2174 28+%	173 2+%	150 2—%

	Laryngitis	Rhinitis	Other Diagnoses	Not Made
Male.....................	38	95	192	1628
Female..................	25	91	208	1766
	63 1—%	186 2+%	400 5+%	3394 45—%

It will be seen that only about 23 per cent. of the positives had a definite diagnosis of diphtheria made by the physician. About 25 per cent. were definitely diagnosed otherwise, while the large number—38 per cent.—in which no attempt, so far as we can tell from the card, was made to diagnose the condition before receiving the culture report, is in itself an indication of the reliance upon the laboratory for diagnosis.

Of the primary negatives less than 4 per cent. were diagnosed as diphtheria by the physicians. Some of these so diagnosed, as shown by succeeding examinations, were diphtheria. It is our rule when the physician's diagnosis is diphtheria, when we find suspicious organisms, or when it is stated that there is a membrane on the pharynx or larynx, to ask for other cultures. We have a record for the year of twenty-five cultures, out of the 292 requested because of the physicians' diagnosis, coming positive on secondary tests.

Thus out of a total of 639 clinical diagnoses of diphtheria we have 372 bacteriological confirmations or a little over 58 per cent. (The tables were based on the primary examinations only.) Others of these cases are sent directly to the hospital without waiting for further culture tests, so the final total would probably show about 60 per cent. of cases where the clinical diagnosis of diphtheria is confirmed by the bacterial findings.

Of 395	cases	diagnosed	? Diphtheria	30%	proved to be	Diphtheria.
Of 522	"	"	?	18%	"	"
Of 58	"	"	Croup	20%	"	"
Of 2316	"	"	Tonsilitis	10%	"	"
Of 193	"	"	? Tonsilitis	10%	"	"
Of 168	"	"	Pharyngitis	10%	"	"
Of 76	"	"	Laryngitis	17%	"	"
Of 199	"	"	Rhinitis	6%	"	"

Of 470 with other miscellaneous diagnoses, 14% proved to be diphtheria, and of 3966 in which no diagnosis was made, 14% proved to be diphtheria.

MEMBRANE.

TABLE IX.

POSITIVES.

	Nares	Pharynx	Tonsils	Larynx	Pharynx & Tons.	Other Combinations	Absent	Not Stated
Male...	16	4	216	1	39	32	168	234
Female	17	13	249	3	63	29	166	279
	33	17	465	4	102	61	334	513
	2+%	1+%	30+%	¼%	7—%	4%	22—%	33+%

NEGATIVES.

	Nares	Pharynx	Tonsils	Larynx	Pharynx & Tons.	Other Combinations	Absent	Not Stated
Male...	34	24	465	7	60	58	1473	1296
Female	25	35	657	13	97	86	1651	1602
	59	59	1122	20	157	144	3124	2898
	1—%	1—%	15—%	¼%	2+%	2—%	41+%	38—%

We have a table here of 2243 cases in which membrane is said to be present, with but 682 or 30 per cent. in which *B. diphtheriae* was demonstrated. Diphtheria bacilli were found in a little less than 10 per cent. where membrane was definitely stated as absent, and in 15 per cent. where no information is given on this subject.

EXUDATE.

TABLE X.

POSITIVES.

	Nares	Pharynx	Tonsils	Larynx	Combinations	Absent	Not Stated
Male...	52	13	189	3	94	77	282
Female	58	9	217	4	86	87	358
	110	22	406	7	180	164	640
	7+%	1+%	26+%	½%	12—%	11—%	42—%

NEGATIVES.

	Nares	Pharynx	Tonsils	Larynx	Combinations	Absent	Not Stated
Male...	193	34	1208	16	330	678	958
Female	162	51	1509	8	372	836	1228
	355	85	2717	24	702	1514	2186
	5—%	1+%	35+%	⅓%	9+%	20—%	28+%

Of 4608 cases where it was stated that exudate was present we found diphtheria bacilli in 725, or about 15 per cent.

Diphtheria bacilli were found in a little less than 10 per cent. of the cases where it was definitely stated there was no exudate, and in over 22 per cent. where no information was given.

CONCLUSIONS.

1. Diphtheria cases should be isolated until two successive negative cultures, taken at least twenty-four hours apart, have been obtained, unless the infecting organism has been proved non-virulent.

2. Patients so isolated are not restrained longer than, nor probably on the average so long as, where an arbitrary time limit of isolation of say ten days from the disappearance of the membrane is enforced.

3. In the majority of cases of clinical diphtheria, the organisms are virulent as long as they persist, regardless of the condition of health of the patient.

4. Swab examinations and short incubation tests are of great value in affording quicker diagnoses.

5. Females have the disease in a slightly larger proportion than males, and the majority of cases are between the ages of one and ten.

6. It is usually at least the second or third day of the illness before proper attempts are made at diagnosis.

7. A bacteriological examination is essential in the diagnosis of diphtheria.

8. The presence or absence of membrane or exudate, as interpreted by the average physician, does not appear to have much bearing on the final diagnosis.

THE QUANTITATIVE DETERMINATION OF B. COLI IN HEAVILY POLLUTED WATERS: A STUDY OF THE PRESUMPTIVE TESTS.

By Dr. GUSTAV F. RUEDIGER and Dr. FREDERICK A. SLYFIELD,

From the State Public Health Laboratory, University of North Dakota, Grand Forks, North Dakota.

A great many substances have been recommended for the rapid and easy detection of *B. coli* in polluted waters. Practically all of these have the disadvantage of giving only a probable indication of the presence of this organism. All of these presumptive tests have been studied in great detail by a number of investigators, but most of these investigations have aimed to determine what percentage of the fermentation tubes containing gas actually contained *B. coli*. It has occurred to us that more extensive studies should be made to determine how frequently the presumptive tests give a negative result when colon bacilli in all probability are present. In order to determine this point, we experimented entirely with the waters of Red Lake River and Red River because our laboratory records gave us a very fair idea as to the amount of pollution of these two rivers immediately above the city of Grand Forks. Our method of study was as follows:

Samples were collected and immediately plated in litmus lactose agar. The amount of water that was put in each plate was determined by looking over our records of previous analyses of samples collected at that particular hour and at that time of the year. If our previous records indicated that the sample probably contained 20 *B. coli* per cubic centimeter, we inoculated four plates each with one-fourth of a cubic centimeter. At the same time we inoculated a series of fermentation tubes containing neutral red lactose broth, lactose bile and sodium taurocholate broth, as recommended by MacConkey and Hill.

In these series we endeavored to inoculate each fermentation tube with so small a fraction of a cubic centimeter of the sample that some of the tubes would not contain *B. coli*, but in at least half of them we aimed to get gas production. For instance, if we estimated that the sample of water contained 15 to 16 *B. coli* per cc. we would inoculate ten tubes of each kind of media with one-twentieth cc., thus using one-half cc. for each kind of media. If now seven of these with one kind of media showed gas on the

third day we would conclude that the sample contained approximately 14 *B. coli* per cc. If our previous records indicated that the sample probably would contain only 2 *B. coli* per cc., then we would inoculate series of four to six tubes of each medium with one-fourth cc. If all of the tubes showed gas within three days we had to conclude that the number of *B. coli* per cc. was greater than the denominator of the fraction of a cubic centimeter put into each tube.

Twenty-five series of fermentation tubes were thus inoculated, the three kinds of media above referred to being used. In all instances litmus lactose agar plates were made at the same time, and all plates and fermentation tubes were incubated at 39° C. The plates were taken out of the incubator at the end of about thirty-six hours, and the number of probable *B.coli* colonies per cubic centimeter was recorded. Lactose agar stab cultures were then made from these colonies, to determine how many actually were *B. coli*. We accepted the culture as one of *B. coli* only when it was found to produce gas in lactose agar, indol in Dunham's solution, and did not liquefy gelatin.

The results of this study are not easily summarized in a few words. The following statements, however, will give a fairly good idea of the results that were obtained:

NEUTRAL RED LACTOSE BOUILLON TUBES: Twenty-five series of tubes of this medium were studied. In fifteen series the results agreed with those obtained by means of plates. In six series the results were too low, and in four series they were higher than those obtained with the plates. We should state, however, that in two of these series, where the fermentation tubes gave higher results than the plates, we had forgotten to incubate the plates for the first twenty-four hours. This gave the saprophytic bacteria a good start and we believe that this explained why the number of *B. coli* found in the plates was so low in these two series. This statement applies as well to the corresponding result with the lactose bile tubes.

LACTOSE BILE TUBES: Twenty-five series were made with this medium. Eleven of these agreed with the results obtained by the plate method. In ten series the results were too low, and in four series they were high.

LACTOSE BILE-SALT MEDIA: Nineteen series were made with this medium. Eight agreed with the results obtained by the plate method, eight were too low, and three gave higher results than those obtained by the plate method.

The results from this study show that neutral red lactose bouillon is the most reliable of the media studied by us for the presumptive test for *B. coli*.

The media used in these tests were prepared as follows:

Neutral red lactose bouillon was made by adding 1 per cent. of lactose and 1 per cent. of a 0.5 per cent. aqueous solution of neutral red to 0.8 per cent. acid bouillon, made from meat infusion.

Lactose bile was made by dissolving 1 per cent. of peptone and 1 per cent. of lactose in fresh undiluted ox bile. The peptone was dissolved by the aid of heat; the solution was then filtered through cotton, tubed and sterilized.

The sodium taurocholate broth was made by dissolving 2 per cent. of peptone, 0.5 per cent. of sodium taurocholate and 0.5 per cent. of lactose in distilled water. Lactose was used in place of dextrose as recommended by MacConkey and Hill. Dextrose was also used in a few parallel series, but the results were not very different from those obtained with lactose. We did not add litmus solution to the media.

Litmus lactose agar plates were made from nearly all fermentation tubes that showed gas within three days, in the hope of isolating *B. coli* in pure culture. These plates were made as soon as the tube was found to have over 15 per cent. of gas, and further gas production had apparently ceased. We did not leave the tube in the incubator until the end of three days, if it was found to have gas earlier.

Ninety-six neutral red lactose broth tubes having gas were used for plates. In ninety of these *B. coli* were found, and six, or 6.2 per cent., gave negative results.

Eighty-three lactose bile tubes having gas were plated for *B. coli* with sixty-nine positive results, and fourteen, or 16.8 per cent., negative results.

Thirty-five bile-salt broth tubes having gas were plated for *B. coli* with thirty positive results, and five, or 14.3 per cent., negative results. Three of these negative results were obtained from tubes containing dextrose.

In this study of various media the neutral red lactose broth gave the best results.

Our negative results from the lactose bile tubes are higher than those reported by other investigators. We cannot explain this fact. We should like to point out, however, that most of the tubes which gave negative results did not show gas before the third day.

It would seem, therefore, that *B. coli* might be found in a larger percentage of positive lactose bile tubes, if only those were plated which showed over 15 per cent. of gas during the first forty-eight hours. Our experience has shown, however, that the number of positive tubes is too low if the tubes are kept under observation only forty-eight hours in making a quantative determination of the *B. coli* present. In many instances none of the bile tubes showed gas on the second day, whereas several of them would have gas on the third day.

Fromme* working in the Hygienic Institute of Hamburg, has very recently shown that *B. coli* multiplies nearly five times as rapidly in 1 per cent. dextrose broth as in lactose bile. It appears, however, that he did not add peptone to the bile in his experiments. We repeated this experiment with lactose bile containing 1 per cent. of peptone and the neutral red lactose broth. Our experiments are as yet inconclusive, but they indicate that some strains of *B. coli* multiply about as rapidly in lactose bile as in the neutral red lactose broth, while some strains multiply more rapidly in the neutral red lactose broth.

To test further this inhibitive effect of bile over certain strains of *B. coli*, we prepared an agar medium by dissolving ten grams of agar-agar thread, ten grams of peptone and ten grams of lactose in 1000 cc. of fresh undiluted ox bile. We also made ordinary neutral lactose agar containing only 1 per cent. of agar-agar thread. This medium was made with meat infusion and not with beef extract. We then plated equal quantities of polluted water in these two media, adding in each case 2½ per cent. sterile litmus solution, After forty-eight hours incubation we invariably found more red colonies in the plates made with ordinary litmus lactose agar. It seems, however, that practically all of the red colonies in the bile agar are *B. coli*, which is not the case in the other plates. It seems that less *B. coli* colonies will be found in the bile agar than in ordinary litmus lactose agar, although our work is not far enough advanced to draw positive conclusions. The total number of colonies in the bile agar plates frequently was less than one-third as high as that in the other plates.

DISCUSSION OF RESULTS.

In making quantitative determinations of *B. coli* in polluted waters by means of fermentation tubes, the most accurate results are obtained by the use of neutral red lactose bouillon. In twenty-five tests where the results were compared with those obtained by means of litmus lactose agar plates, fifteen were in agreement, six were too low and four were higher than was indicated by the plates. In two of the latter we have reason to believe that the results given by the plates were too low and those by the fermentation tubes were nearly correct.

When lactose bile was used in the fermentation tubes, eleven results out of twenty-five agreed with those obtained with litmus lactose agar plates, ten results were too low and four were higher than those given by the plates. In two of the latter the plates appeared to give too low a result.

*Zeitschr. f. Hygiene, 1910, Vol. 65, p. 251.

With the use of lactose bile-salt broth only eight results out of nineteen were in agreement with those given by the plates; eight were too low and three were too high.

In this study it was evident that gas appears earlier in the neutral red lactose bouillon tubes than in the bile tubes, and that *B. coli* can be easily isolated from a larger percentage of the positive tubes with neutral red lactose bouillon than with the positive lactose bile tubes. The finding of *B. coli* in the fermentation tubes is greatly facilitated by making plates soon after the appearance of gas. We must state, however, that the water we used in this study gave a relatively low bacterial count with a large number of *B. coli* per cubic centimeter. Different results might be obtained with a water giving a high bacterial count with relatively few *B. coli*.

THE VALUE OF THE ESCULIN TEST.

F. E. HALE and T. W. MELIA,
Mt. Prospect Laboratory, Brooklyn, New York.

In August, 1908, F. C. Harrison and J. Van der Leck* read a paper before the Laboratory Section of the American Public Health Association, during the convention held at Winnipeg, presenting the results of their experience with a new presumptive test for "excretal *B. coli.*" This test consists in the production of a black color in the medium employed, whether liquid or solid. The formula given by them is as follows:

LIQUID MEDIA.

1 or 2% Witte's peptone.
0.5% sodium taurocholate (commercial) †
0.1% esculin.
0.05% iron citrate.‡
100 cc. water.

SOLID MEDIA.

As above with 1.5% agar.

The net results of their work were as follows:

B. coli, *B. aerogenes*, lactose fermenting yeasts, and some molds gave the test. Forty other species or varieties of bacteria and yeasts did not give the test. In sixty samples of water giving the test they succeeded in isolating *B. coli* or *B. aerogenes.*

From experiments with the medium, with bile salts omitted, they had not reached definite conclusions, but believed that the results would prove as satisfactory and more delicate.

This medium offered such attractive possibilities that we began testing it at once. As the value of the test for routine water work depends upon its specific character, tests were made upon all the strains of varieties and species of bacteria in our possession, employing the liquid formula (1 per cent. peptone) with and without bile salt in test tubes. All cultures tested were previously rejuvenated in beef broth and plated out before testing. The following table gives the results of these experiments:

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* Am. Jour. Pub. Hyg., Vol. 19, No. 3, page 557, Aug., 1909; also Trans. Royal Soc. Can. (3) 2, IV, 105–110, 1908.

† The term sodium glycocholate should be substituted for taurocholate in the above formula, since the glycocholate is the salt actually present in the commercial taurocholate.

‡ We have found it preferable to keep the iron separate, as it precipitates in the presence of peptone.

TABLE SHOWING ESCULIN REACTIONS WITH VARIOUS SPECIES.

SPECIES	Number of strains tested	Reaction with bile salt present	Reaction with bile salt absent	Color
B. coli Group				
B. communior A_1*	5	+	+	black
" A_2	5	+	+	"
" B	2	+	+	"
" C	3	+	+	"
B. communis A	2	+	+	"
" B	2	+	+	"
" C	1	+	+	"
B. aerogenes A_1	3	+	+	"
" A_2	2	+	+	"
" A_3	2	+	+	"
" B	1	+	+	"
" B^2	2	+	+	"
B. acidi-lactici A_1	1	+	+	"
" A_2	1	+	+	"
" B	9	+	+	"
Str. pyogenes	3	+	+	"
Str. salivarius	1	+	+	"
M. pyogenes aureus	1	+	+	"
B. pneumoniae (Friedlander's pneumococcus)	1	+	+	"
B. ——(liquifier)	4	+	+	"
B. salmoneum	1	—	+	brown
B. arborescens	1	—	+	"
B. fluorescens liquifaciens	2	—	+	blue-black
B. pyocyaneus	2	—	?	"
B. enteritidis	1	—	?	brown
B. vulgaris	1	—	+	blue-black
B. cloacae	1	—	+	brown-black
B. sporogenes	6	—	+	"
B. Welchii (Alpha)	3	—	—	unchanged
" (Beta)	1	—	—	"
B. dysenteriae (Jurgens)	1	—	—	"
B. dysenteriae (Kruse)	1	—	—	"
B. dysenteriae (Shiga)	1	—	—	"
B. paratyphi (Beta)	1	—	—	"
B. typhi	9	—	—	turbid white
B. alkaligenes	1	—	—	"
B. Zenkeri	1	—	—	unchanged
B. prodigiosus	1	—	—	"
B. ruber	1	—	—	"
B. erythrogenes	1	—	—	"
B. Havaniensis	1	—	—	"
Sarc. lutea	1	—	—	"
B. icteroides	1	—	—	"
B. violaceus (Berolinensis)	1	—	—	"
M. ureae	1	—	—	"
Str. equinus	1	—	—	"
Str. lacticus	1	—	—	"

* Two unclassified forms, one chromogenic, the other a liquefer, which otherwise correspond with *B. communior*, give the esculin test.

Of the above mentioned species Harrison and Van der Leck tested with bile-salt present and found similar results with the following:

B. communis, *B. aerogenes*—positive reaction.

B. fluorescens liquifaciens, *B. vulgaris*, *B. cloacae*, *B. Zenkeri* and *B. prodigiosus*—negative reaction.

They also mention the following additional forms as giving a negative reaction:

B. fluorescens, *B. lactis viscosus*, *B. butyricus*, *B. mesentericus*, *B. mycoides*, lactic acid bacteria (5 species), slimy milk bacteria (3 species).

It is at once apparent that the addition of bile salt plays an important part in the test, since in the absence of bile salt, a number of species give a brown to black color, and sometimes a dark precipitate which would render the test uncertain.

Even with the bile salt present several species give the test which do not produce gas in sugar media and are not related to the *B. coli* group. *Str. pyogenes*, isolated from horse feces, from the tonsils in a case of tonsillitis and from milk, *Str. salivarius* from sore throat, *M. pyogenes aureus* from tonsillitis, Friedlander's pneumococcus, and an unidentified liquefier from water supply. The latter species was found in routine examination of a water supply at times when no gas-former was present. It is a facultative anaerobic, motile bacillus, producing positive results with esculin, giving the indol reaction, reduction of nitrate to nitrite, acidity on litmus lactose agar, and coagulation of milk with acid reaction. It produces a small amount of gas in liver broth* but no gas in dextrose or lactose broths.

Hence the test cannot be relied upon to prove the presence of *B. coli* in presumptive routine work. It is valuable, however, as a additional test in the identification of specific forms; for example, probably all members of the *B coli* group, as classified by D. D. Jackson,† respond to the test, but *B. typhi* (nine strains from a wide variety of sources, European and American), *B. paratyphi* B, and *B. dysenteriae*. (Jurgens, Shiga, and Kruse) do not give the test.

The delicacy of the test, as compared with lactose bile, was tried by planting a sufficient number of dilutions, by tenths, of a pure culture of *B. coli* in both media until a negative test was reached. Both media gave a positive test in the same dilution (1–10,000,000 cc.). A comparison was then made in a similar manner with an infusion of horse feces. In this test the esculin was positive in 1–10 cc. in twenty-four hours, 1–10,000 cc.

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* Jour. Infect. Dis., Vol. VIII, 1911, pp. 289–294. Presented at Convention of Am. Pub. Health Association, 1909.

† Jour. Infect. Dis., Vol. VIII, 1911, pp. 241–249. Presented at Convention of Am. Pub. Health Association, 1910.

in forty-eight hours, and the lactose bile was positive in 1–100,000 cc. in twenty-four hours, and in 1–1,000,000 cc. in forty-eight hours. In another series with infusion of horse feces, the esculin was positive several dilutions beyond the lactose bile, due to the production of a positive test by *Str. pyogenes*. Indeed, this experiment lead to the discovery of such effect by *Str. pyogenes*. In the same manner, in two series comparing milk, and a series comparing sewage, the esculin and lactose bile gave positive results in the same dilutions.

Hence it may be safely stated that in delicacy of reaction the esculin and lactose bile tests are about equal. The esculin test does not appear uniformly in twenty-four hours. All tests were allowed to continue for from four to five days.

CONCLUSIONS.

1. Sodium glycocholate should be retained in the formula, since the color reaction is more definite, and is given by fewer species.
2. In delicacy of reaction the esculin test is about equal to the lactose bile.
3. The esculin test cannot be relied upon as a *presumptive* test for *B. coli*, since positive results may be produced by at least five species which are not gas-formers.
4. The esculin test is, however, very valuable as an additional confirmatory test in the identification of species, since, for instance, it makes a sharp distinction between the *B. coli* group, on the one hand, and *B. typhi*, *B. paratyphi*, and *B. dysenteriae*, on the other hand.

The Massachusetts Association of Boards of Health

OCTOBER—QUARTERLY MEETING
Boston, Massachusetts

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, October 19, 1911, Dr. Henry P. Walcott, President, presiding.

On recommendation of the Executive Committee the following persons were elected to membership in the Association:

Dr. L. R. Burnett, Board of Health, Milton.
Mr. W. C. Tucker, Inspector of Milk, Milton.
Dr. E. M. Brastow, Inspector of Animals, Wrentham.
Dr. F. G. Barnum, Board of Health, Hyde Park.

REPORT OF COMMITTEE ON MILK LEGISLATION.

There were eighteen bills relating to milk before the last session of the legislature. Of these, three survived and were placed upon the statute books, while the other fifteen were rejected.

Your committee did some work in support of these three new laws which are: An act relative to the establishing of milk distributing stations in cities and certain towns; an act to authorize the incorporation of medical milk commissions; and an act relative to the labeling of evaporated, concentrated, or condensed milk.

House Bills 350 and 1332 were the most important of the Bills that failed to pass. House Bill 350 was recommended by the State Board of Agriculture, and easily passed both branches of the legislature, but was vetoed by the governor. A strong but unsuccessful effort was made to override the veto. This Bill, if enacted, would have legalized the milk regulations of local boards of health, which, in the opinion of some, is made necessary by a recent decision of the Massachusetts Supreme Court. House Bill 1332 was presented by the Massachusetts Milk Consumers' Association, and was later amended, becoming No. 1943, better known as the Ellis bill.

The Milk Consumers' Association Bill, as first drawn, was viewed with some concern by your committee, since it could be interpreted as depriving local boards of health of their right to supervise the milk supplies of the communities whose health they were charged with safeguarding. After

several conferences with the Executive Committee of the Milk Consumers' Association their Bill was modified, and your committee withdrew opposition to it. The Bill was finally vetoed.

Your committee recommends that at the next session of the legislature, there be introduced and supported some such bill as House Bill 350 of the last session, which read:

"The board of health of any city or town in this commonwealth is authorized to issue permits for all milk or cream received, held, kept, offered for sale, or sold in said city or town and subject to such conditions as it may make; and to forbid the sale of any milk or cream produced, transported, or kept under conditions not approved by the said board of health."

(Signed), Geo. E. Bolling, Chairman.

On motion of Dr. Durgin, the report was accepted and the recommendation adopted.

THE LABORATORY DIAGNOSIS OF GLANDERS.

By B. L. ARMS, M. D.,
Director, Bacteriological Laboratory, Boston Board of Health.

Glanders exists in nearly all parts of the civilized world, but is most common in the temperate zone where a more active traffic in horses exists. This is one of the oldest known diseases of horses. It was known to Aristotle and Hippocrates. The Roman authors Apsyrtus and Vegetius described glanders, the latter recognizing several varieties, especially that of the nose and skin. Its infectiousness was recognized as early as the seventeenth century. Solleysel, in 1664, supposed it could be transmitted by the air, and Van Helmont, in 1682, considered it to be identical with human syphilis. As early as 1734 Saunier gave precise directions for disinfecting stables. Garsault, in 1741, and Bourgelat, in 1764, recommended the immediate slaughter of horses suffering from glanders, and the segregation of suspected animals.

The causative agent of the disease, *Bacillus mallei*, was first accurately described by Loeffler and Schutz in 1882, when they isolated from glandered horses the organisms which fulfilled all of Koch's postulates. The organism is a bacillus which grows in the presence of oxygen and produces a characteristic growth on potato, a so-called honey-like growth, in thirty-six to forty-eight hours at body temperature.

Mallein was produced and investigated in 1891 by Kalning and Hellmann, and was the first extensive laboratory aid to the diagnosis of glanders, although the method of Strauss slightly antedates it. Mallein is a liquid prepared by growing *B. mallei* in glycerine broth for six to eight weeks, after which the organisms are killed by boiling, and carbolic acid added as a preservative; the product after filtering, bottling and sterilizing, is ready for use.

Strauss,* in 1886, discovered that when material containing virulent *B. mallei* was injected into the peritoneal cavity of a male guinea-pig, scrotal lesions developed, and since the publication of his article in 1889 the test which bears his name has been quite generally used. In making this test, material from the suspected lesions is secured, usually on sterile swabs, and sent to the laboratory, where it is moistened with sterile water or salt solution, and inoculated into male pigs, those weighing at least 500 grams being preferred. It is customary to use two pigs for each case, giving one twice as much of the suspension as the other, in order to obtain

* Strauss: Compt. Rend. Acad. d. S 1889, 108 p. 530.

the diagnosis as soon as possible. A culture from the swabs is also made, for it sometimes occurs that a positive result is obtained in this way when the pigs are negative, although, before a positive diagnosis is returned, organisms obtained in this manner are always proved by inoculation into pigs and the production therefrom of typical lesions. The scrotal lesions in the guinea-pig develop in from two to five days in the great majority of cases, but may be considerably delayed. In these delayed cases we frequently find lesions in other places, as in the omentum, glands and at the inoculation site; consequently careful autopsies are made on all such animals.

Agglutination tests were next introduced and there have been many methods of performing these tests. The microscopic test is made in practically the same way as the Widal test but it is very little used and has never been extensively employed. Macroscopic agglutination tests have been more reliable and there is a constant gain in their reliability.

An early method was to grow *B. mallei* in broth containing the serum to be tested; if this was from an animal with glanders, flakes, composed of bacilli which had agglutinated, would settle to the bottom, while if the serum was from a normal animal no flakes would be found.

A later method was to add *B. mallei* to tubes of serum diluted to strengths varying from 1–50 to 1–5000, these were then incubated from ten to fifteen minutes at 37°C. and examined. The reaction was considered typical when the higher dilutions were clear, with a precipitate of bacteria in the bottom of the tube, while in a negative reaction the fluid was uniformly cloudy.

Following this method came the precipitation test of Dr. D. Konew, Director of the Bacteriological Laboratory in the Veterinary Institute of Charkow, Russia. He introduced a test fluid named malleasa which was made by dissolving a 48° hour agar growth of *B. mallei* with an eight per cent. solution of antiformin, and using a solution saturated with *B. mallei*. As this solution is strongly alkaline it is neutralized with five per cent. sulphuric acid and then filtered, first through filter paper and then through a Berkefeld filter, in order that the resulting fluid may be homogeneous without any undissolved bacilli being present. In performing the test 1 cc. of the malleasa is put into a test tube of small diameter and 1 cc. of the serum to be tested is allowed to run slowly into the bottom of the tube through a capillary pipette, and being heavier than the malleasa, it remains at the bottom of the tube, while the test fluid is forced up. A positive reaction occurs when, at the junction of the two fluids, a whitish ring is formed, similar to the ring in Heller's test for albumen. Needless to say no ring occurs in a negative reaction.

The latest and most satisfactory agglutination test is made by the use of the centrifuge; in this the test fluid consists of an emulsion of *B. mallei*

grown on glycerine agar for from thirty-six to forty-eight hours, then heated for two hours at 60°C. to kill the organisms. The bacilli are then washed from the surface of the agar with sterile salt solution containing a five-tenths per cent. carbolic acid. This suspension of killed bacilli is brought to a standard density and after being kept for about two weeks in the ice chest is ready for use. The fluid should be made from a mixture of eight to ten strains of *B. mallei* in order to produce the best results.

The serum to be tested is diluted in test tubes with the carbolized salt solution, the dilutions ranging from 1–300 to 1–8000; these tubes are then centrifugalized at 1600 revolutions per minute for ten minutes and allowed to stand for an hour and half, when the findings are read. The appearance of a veil-like clumping at the bottom of the tube, with the upper part of the fluid clear, indicates an agglutination, while the collecting of a dense white precipitate at the bottom of the tube, with a cloudiness in the supernatant fluid, indicates a negative reaction.

The latest method for the diagnosis of glanders is known as the complement fixation test. In this the principles of the Wasserman reaction were first employed by Schutz and Schubert, who published the results of their work in 1909†. It is a well-known fact that if the red corpuscles of one animal are inoculated into an animal of a different species, the serum of the inoculated animal acquires the property of dissolving the red corpuscles of the former. The process is rather complicated but extremely interesting. The necessary ingredients for the test are an immune serum or amboceptor, an extract of *B. mallei* or antigen, some guinea-pig serum or complement, some sheep corpuscles, and the serum of the animal to be tested.

The preparation of the immune serum is the first step; this is procured by inoculating a rabbit with washed sheep corpuscles, giving three inoculations at intervals of a week. Five or six days after the third injection, a small amount of blood is drawn and the strength of the serum is determined. As there is a great variation in the strength of the serum from different rabbits, it is safer to carry two or three along at the same time. If the serum will cause hemolysis when diluted 2000–4000 times, it is ready for use. From 10 to 15 cc. of blood may be drawn from the rabbit, under sterile conditions, and put into the ice chest to allow the serum to separate from the clot, after which it may be carbolized and bottled in small amounts. These bottles should be securely sealed in order that the serum may be kept for some time, since very minute quantities are used for a test. To ascertain the hemolysing strength, the serum is diluted with salt solution in a series of tubes ranging from 1–100 to 1–4000, and the highest

† Schutz & Schubert, Archiv fur Wissenschaftliche und Praktische Tierheilkunde, Band 35, Heft 1–2, pp. 44–83, 1909.

dilution in which there is complete hemolysis represents the titre of the serum tested. In the test the serum is used at double the ascertained strength. The titre remains stationary for three or four weeks.

The antigen, or glanders bacilli extract, is prepared by growing the organisms on agar for from twenty-four to forty-eight hours at 37°C.; these are then washed off the surface of the agar with sterile salt solution and the resulting fluid is heated at 60°C. for four hours to kill the bacilli. It is then put into a shaking machine and shaken continuously for four days.

The fluid is next placed in centrifuge tubes and centrifugalized for two hours at a speed of 2500–3000 revolutions per minute; at the end of this centrifugalization, ten per cent. of a five per cent. carbolic acid solution is added and the material bottled for use. The strength is established by titration and for the test one-half the established strength is used.

The complement is obtained from a guinea-pig and must be not over two days old. The blood may be drawn from the heart of a guinea-pig with a syringe, or a pig may be anesthetized and bled. If the former method is used, 6 to 8 cc. may be obtained from a good sized pig, while if the pig is killed he will furnish from 12 to 15 cc. The serum is allowed to separate from the clot and may be poured or pipetted off, and as there is a great variation in the strength of the serum from different pigs, it must be titrated each time.

In all steps great care must be taken to use exact quantities of the materials to be tested, as otherwise the entire day's work may be lost.

The corpuscles of a sheep may be obtained, either by keeping a sheep on hand to supply them as needed, or they may be obtained from an abattoir whenever the test is to be made.

Blood is drawn from the animal to be tested by opening a superficial vessel under aseptic precautions, and drawing from two to three ounces of blood, which is allowed to separate, the serum being the portion used for the test. This serum must be inactivated by heating to 58°C. for thirty minutes and it is better to follow this by fifteen minutes at 59°C. In case the blood is from a mule it should be heated to a slightly higher temperature.

Dilutions are made of the various ingredients according to the titrations, and except when in use they should be kept in the ice chest; these are the immune serum, the glanders bacilli extract, the guinea-pig serum, a five per cent. suspension of sheep corpuscles, and, without dilution, the sera to be tested. In the test, when immune serum, glanders bacilli extract, guinea-pig serum, and sheep corpuscles, are referred to, the reference is to these dilutions. For each serum four tubes are used, the first and third for the test, and the second and fourth as controls. Into each of the first and third tubes is put 1 cc. salt solution and 2 cc. into each of the

second and fourth; of the serum to be tested 1 cc. is next put into each of the first two tubes, and 2 cc. into each of the last two. Of the glanders bacilli extract, 1 cc. is now put into the first and third tubes, and 1 cc. of the guinea-pig serum is added to each of the tubes. After shaking, the tubes are placed in the incubator at 37°C. for an hour, in order to anchor the antigen and the glanders immune body in which the complement will become firmly fixed, if the serum to be tested is from an animal infected with glanders. After this short incubation the tubes are ready for the final step, which consists of the addition to each tube of 1 cc. of the immune serum and 1 cc. of the sheep corpuscles. Each tube is thoroughly shaken, and placed in the incubator at 37°C. for ten hours, when the final results are observed.

In case the serum tested is from an infected animal, the corpuscles will be found at the bottom of the first and third tubes, while the second and fourth will show dissolution of the corpuscles and the fluid will be colored by the hemoglobin set free. In negative cases all four tubes will show complete hemolysis.

In making these tests each step must be controlled, and accordingly each time tests are made a known positive blood is run and a known negative. In addition to these each different stage is controlled thus:—a tube corresponding to the first tube is run without the horse serum, all other ingredients being the same; a tube with 2 cc. of the glanders bacilli extract and 1 cc. each of the guinea-pig serum, immune serum and sheep corpuscles; another tube containing salt solution, guinea-pig serum, immune serum and sheep corpuscles; another with salt solution, guinea-pig serum and corpuscles; one with salt solution, immune serum and corpuscles, and finally, one with salt solution and corpuscles only. It will be readily seen that failure to faithfully carry out any step will be shown by the controls and the cause of the trouble thus determined.

The fact that this test is made from the blood makes it an extremely valuable one, especially in those cases in which the lesions are deep seated and also in cases of a mixed infection.

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Mohler & Eichhorn, U. S. Dept. of Agriculture, Bulletin 136. The Diagnosis of Glanders by Complement Fixation.

DISCUSSION.

Dr. Adolph Eichorn. Dr. Arms has selected a subject which is of great importance, not only to the professional men who are directly concerned in the prevention and treatment of animal diseases, but likewise to those who are interested in diseases of human beings. Glanders, primarily a disease of solipeds, is nevertheless communicable to man, and that he does suffer from it with comparative frequency is proven by the cases which occur at intervals in various parts of the country. Only about two weeks ago I was informed of the death of a somewhat prominent Connecticut veterinarian who had become infected with glanders while handling horses. In Washington we had two cases of glanders in human beings during the past year. Furthermore, I believe there are many cases of glanders occurring in human beings which are not so diagnosed, probably because very little thought has been given to this disease in man. The diagnosis of glanders has always been more or less difficult because no method was available by which the cases, particularly the ones which were atypical clinically, could be diagnosed with a degree of certainty.

Up to about a year or two ago we considered the mallein test as the best at our command for diagnosing the disease; it was known to veterinarians that the application of mallein did not always give correct results. Cases of glanders sometimes failed to react; and typical or anti-typical reactions were sometimes secured from horses which were not affected with glanders. Therefore when a method was discovered by which glanders could be more accurately diagnosed, it was considered a great step toward the control and eradication of this disease. This method, as Dr. Arms mentioned, is the complement fixation test, which is practically identical with the biological test used for the diagnosis of syphilis. A positive reaction is always considered an indication of syphilis, and the same rule also applies in the application of the test to glanders: a positive reaction means glanders infection, as the results are not affected by the presence of any other disease.

In Washington, up to the present time, we have tested 1540 cases sent from different parts of the country, and the results are very gratifying. We found that the autopsies performed by inspectors of the Bureau of Animal Industry in Washington and in different parts of the country, on suspected glanders cases in which a complement fixation was obtained, invariably showed the presence of the disease. The lesions were characteristic, and in many cases their character was demonstrated both by bacteriological and histological examinations. The application of this

test, of course, will always remain confined to properly equipped laboratories; but this will not cause any difficulty, because the blood serum can be readily obtained from any number of suspected or exposed horses and sent to the laboratory, where a great number of tests can be made, since five, ten, or even twenty tests can be made in practically the same length of time as one. It is essential to obtain satisfactory clear serum for the test. To accomplish this, the blood is drawn from the jugular vein of the horse to be tested, with the ordinary precautions. The serum is then allowed to separate from the clot in a cool, dark place, and is forwarded to the laboratory either in the original container, or the serum is poured off from the clot into another vessel, wherein it is forwarded for the examination.

The control and probably eradication of glanders by this test could be readily carried into effect if the official German method of testing all the horses in a stable where glanders is found, could be carried out. Blood is drawn from every horse and subjected to the complement fixation test. Those horses which give a positive reaction are slaughtered. The remaining horses are retested in about two weeks, for any of the animals in the stable which were in the incubation stage on the first test, will probably react at the second test. If all animals prove free on the second test then the stable is considered free of the disease. It may be possible to induce communities that are anxious to eradicate glanders to adopt the German procedure and compel the application of the complement fixation test on all horses within the town or city limits, for it is reasonably certain that the disease could be eliminated if this were done, if at the same time it were required that all horses brought into the community be subjected to the test.

The test is specific, as a specific organism, the glanders bacillus, is used against specific anti-bodies or immune bodies which are present in the horse, and only against such immune bodies will the glanders antigen prove effective. A fixation will not take place in the presence of any other immune body than that of glanders. In the laboratory of the Bureau of Animal Industry we have taken serum from horses afflicted with all kinds of diseases and tested them against the glanders antigen. In no instance did we find that the horse serum which originated from other diseases than glanders fixed the complement. That is, we obtained hemolysis in all instances, which shows that the test is specific; accordingly, a fixation of the complement is a certain proof of glanders.

The Board of Health in Boston certainly should be complimented and congratulated that it has taken up this work immediately after the Bureau of Animal Industry proved its reliability. The work, of course,

will have to be extended, and not only the clinical cases which give the reaction should be destroyed, but all cases which give a positive complement fixation test should be slaughtered. Only by this method will it be possible to control the disease. It is known that not only the clinical cases of glanders are dangerous, but that the occult and latent cases are also, because in the clinical cases the owner and the veterinarian may suspect the disease by the symptoms which are present in the animal, whereas the animal suffering with an occult or latent case of glanders may be in prime condition, yet daily expel glanders bacilli in great numbers. The nodules which are invariably present in the lungs of an infected animal may communicate with bronchi, and of course in such instances whenever the animal coughs numerous bacilli are expelled, and thus the infection is constantly disseminated. Therefore, the work of destruction should not be confined to the clinical cases, but be extended to the occult cases of glanders.

A SUMMARY OF MILK REGULATIONS IN THE UNITED STATES.*

By EDWIN HENRY SCHORER, M. D.,
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Customs and rules and regulations concerning milk have been established either by the consumer or the government for many years. At this we wonder little, if we take into consideration the important part milk and its products play in our food. The laws of the old Egyptians, the Mosaic, and the Roman laws, concerned foods generally. Venice was probably the first city to make specific regulations concerning milk, since in 1599 it passed regulations regarding an epidemic occurring in milk-producing animals. It was not, however, until chemists established accurate methods of milk analysis, that our more modern regulations appeared. Hamburg, in 1818, was the first city to establish police regulations concerning the abuses of the milk trade. This type of regulation still exists, and in many places is the only kind of regulation considered necessary. However, overlapping the period of such legislation, is another and more important period which is characterized by the attempt to so regulate the production, delivery, and consumption of milk that it will not be deleterious to the health of the consumer. To accomplish this purpose the medical profession has tried to suitably modify milk, and health officials have undertaken the more important work of enforcing the production of milk that is clean, and free from disease-producing elements. There is a growing realization of the fact that while watering, skimming, or in any way reducing the food value of milk, is fraud or theft, still these practices do not menace health; whereas cows suffering from diseases communicable to man through milk, and milk infected with the specific micro-organisms of disease, or milk wherein bacteria have multiplied enormously, must be considered as definite health problems.

The existing official regulations are of great importance, and exhibit many fundamental problems. It must be decided whether there should be uniform regulations extendingover a whole country, or a whole state, or whether the regulations should be purely local, and it must be determined whether the regulations ought to guard against fraud, or against disease,

* Preliminary Report.

† Milk research fellowship established and supported by the Milk and Baby Hygiene Association of Boston.

or against both. Moreover, it is important to find out the best requirements, and methods of regulation necessary to secure proper protection.

During the past two months I have made an effort to secure from each state and from cities of over 50,000 population, answers to questions on these points, and I have also tried to get from them copies of regulations concerning their milk supply. Questions were asked to ascertain what requirements are regarded as most important, as well as to obtain certain information not ordinarily included in reports and regulations. In order that the questions might be answered by the proper officials, the letters were sent to the governors of states and mayors of cities, who were asked to refer them to the proper officials. Up to October 16, thirty-one state officials have sent in complete returns, and the officials of seventy-five out of one hundred and nine cities of over 50,000 population, have responded. It was found that in many cities, officials have tests and standards not prescribed by ordinance or rule. Because this is only a preliminary report, and not yet complete, many of the details must be omitted, and only a few special points brought out.

The standards of eleven states are the same as those of the United States as prescribed by the Secretary of the Department of Agriculture. So far, three states have reported that they have no regulations. The question was asked whether at present a high uniform standard for the state was favored; the officials of two states answered that they had a fat requirement of only three per cent., and two officials in states using the United States standard, wrote that higher uniform standards could not be enforced and would be detrimental. An official from a southern state wrote, "these matters ought to be left to the municipality." All the states having milk regulations require that milk for human consumption shall be drawn from healthy cows only. In many states it is evident that this regulation is merely a copy of the United States standard. Only two state officials who reported to me, definitely stated that they require the tuberculin test. The whole milk question for the state is usually taken care of by the board of health, or by the agricultural department, which is often connected with the agricultural college of the state. In one state the matter is left with the county attorney who can require the chemist of the state agricultural college to make analyses. Whenever a state has a laboratory, a chemist is employed to make chemical milk examinations, which emphasizes the importance given to fraud rather than to sanitary requirements. The state laboratories are little used by the cities, except in one state in which all milk work is done in the laboratory of the state. By far the largest number of officials believe they are hindered by lack of

funds and inspectors, but some say jury trials, "shyster" lawyers, etc., are obstacles to efficiency. Many states require a license to sell for direct consumption. In some states the officials must publish the names of persons licensed to sell milk and of those whose milk licenses have been revoked.

The necessity for regulations in regard to milk for dirict consumption is much greater, and more important in the city than in the country. All of the cities, except one, from which reports have so far been received, have officials of their own to handle the milk problem, and nearly all of the cities print their own regulations and ordinances. In comparing state and city regulations, it was found that so far as chemical constituents are concerned, the standards of cities are generally the same as those of the state wherein they are located, but this is not always so for there are some cities with higher and some with lower standards than those prescribed by state law. Exactly what happens when a city has a lower requirement than is set by the government of the state in which it is located, I have not yet learned. It is to be noted that in many cities, even though a specific gravity standard be not set by law or rule, the lactometer reading is used. The standard for butter fat varies in the different states and cities from two and five-tenths to three and seventy-five hundredths per cent. Many cities have farm and local inspection and have bacteriological standards. It was only in 1900 that the first bacteriological standards were established, yet the increasing realization of the importance of standards for sanitary conditions has led to their widespread introduction. Bacteriological standards vary as follows:

Cities of over 100,000 Pop.			
1 city	=less than	50,000	per cc.
2 cities=	"	100,000	"
1 city =	"	200,000	"
2 cities=	"	250,000	"
1 city =	"	300,000	"
9 cities=	"	500,000	"

Cities between 50,000 and 100,000 Pop.		
2 cities	=100,000	per cc.
1 city	=200,000	"
2 cities	=300,000	"
11 cities	=500,000	"

In addition to the above, two cities notify the producer if the bacterial count is over 500,000 per cc.; one city encourages the producer when counts are below 100,000 per cc. and reprimands him when they run over 500,000 per cc.; one city inspects the farms and dairy methods when the counts rise above 100,000 per cc. The bacterial standards of one city vary with the kind of milk; thus raw milk must not contain over 250,000 bacteria per cc., pasteurized milk not over 50,000 per cc., and cream must contain less than 500,000 per cc. Of the seventy-five city officials who have so far responded to my questions thirty-seven of them give more or less attention to bacterial counts.

Both state and city regulations require that milk must come from healthy animals kept under sanitary conditions. The returns from five cities show that the tuberculin test is used to diagnose tuberculosis, and milk from reacting animals is excluded from these cities. One city by its rules excludes milk from reacting cows, but the state legislature has prohibited this regulation. Two cities have regulations which can exclude milk from reacting animals, while in the regulations of one city the method of diagnosis of tuberculosis is specifically defined as "according to the recognized physical signs and symptoms of bovine tuberculosis." A number of officials wrote that new ordinances now under way will include the tuberculin test and some other officials feel the test is badly needed in their regulations.

In the answers to the question, "On what test or tests do you accept or reject milk?" it was found that the Babcock butter fat test is the most universally used by city officials; next in importance are specific gravity, solids (calculated or determined) and counts of bacteria per cubic centimeter. Of the tests made on the street the temperature test is most frequently used and the maximum temperature at which milk may be kept varies from 45° F. to 70° F. in the different cities. Next in frequency of use as a street test is the specific gravity determination, which, as stated before, is very often not mentioned in ordinances or printed rules. Examination of milk for visible or determinable sediment or dirt is also frequently used as a street test.

Of tests giving results early enough to prevent the sale and consumption of milk below standard, lactometer readings, inspection, temperature, and detection of dirt, are the most frequently used. Officials of about one half the cities stated they make no tests that give results early enough to prevent the sale and consumption of milk found below standard.

Only two cities prohibit the sale of skimmed milk but in nearly all of the cities it must be labeled "Skimmed Milk". A few cities have no regulations in regard to cream; in those that have regulations the butter fat requirement varies from twelve to forty per cent. In one city it must be labeled "whipping cream" or "coffee cream." Relatively few cities have bacterial standards for cream.

Information was also sought in regard to the number of farms supplying each city, the greatest and average distance milk is brought, and what percentage is within wagon haul; what processes were used to pasteurize the milk and what percentage of the total milk supply was pasteurized. The replies are tabulated in such a manner as to show the greatest variations:

	Cities over 100,000	Cities 50,000 to 100,000
Number of farms supplying the city....	135 to 44,000	35 to 1,000
Greatest distance......................	10 to 425 miles	10 to 70 miles
Average distance.......................	5 to 250 miles	3 to 50 miles
Percentage within wagon haul.........	Less than 1% to 90%	All (9 cities) to 40%
Percentage pasteurized................	None to 75%	None to 50%

The method of pasteurization varies in the different cities. In some the flash method is used entirely, while in others the holding method is used entirely, but in almost all cities, where a large part of the supply is pasteurized, both methods are used. In one city an electrical process is employed and is claimed to be efficient. The efficiency is probably due to the temperature to which the milk is heated during the process.

For the general supply, milk is retailed at an average price of eight cents per quart, although the price varies from six to fifteen cents in the different cities. Certified milk varies in price from ten to twenty cents per quart. Except when he delivers his own milk, the producer receives from one-third to one-half the price paid by the consumer.

The methods followed in different cities to protect against fraud and to furnish clean milk vary a great deal. Three important methods are used to enforce regulations: fines are imposed; licenses and permits to produce milk for sale or to sell are refused or revoked; or the milk is destroyed. Most cities impose fines, as well as resort to the other methods mentioned. In many cities only the seller or dealer is fined, and the producer is penalized by either refusing admission to the city of such of his milk as is below grade, or by destroying it. A few cities impose no fines but revoke permits and destroy milk below standard. The method of destroying milk varies; in some cities it is returned to the farm, in others it is poured into the sewer, and in one city a red dye is added to milk found above a certain temperature. Fines are most frequently imposed for failure to meet the chemical standards or for adulteration, while warning and exclusion of milk produced under insanitary conditions follow inspection and high bacterial counts. In some cities if milk is adulterated the ordinances require imprisonment of the offender for the second and subsequent offences; in one city the third offence of this kind results in the permit to sell milk being revoked for one year.

Of the cities from which returns have so far been received, thirty-eight have special milk for infant feeding. In a number of these cities such milk is furnished only during the summer months. In three cities this supply is under the management of the board of health, while in sixteen

cities charitable organizations furnish special milk for children. There are Walker-Gordon laboratories in eight of these cities, and in fifteen others private dealers furnish special milk for infant feeding. The returns from five cities having such milk do not state who is supplying it.

Officials of about one-half the cities wrote that they lack sufficient funds and inspectors; this complaint was less frequent in southern than in northern and western cities. While lack of funds and inspectors are the most frequent obstacles to efficiency, complaint is made that low-standard lawyers, the opposition of the courts and especially shown in jury trials make law enforcement difficult. An official of one city reported that it takes one-half of the energies and time of his department to fight so-called reform legislation of a sort not needed and of a kind designed to give someone an undue trade advantage. Officials of several cities of the southwest consider that the cattle in that part of the country at the present time are unsuited to the production of milk. One of my questions read as follows: "Whom do you find more reliable, the large dealer or the small selling producer?" In answering this question the officials in most cities seemed to favor the large producer. A reason given for this was that the large dealer can control his business more easily and that he has a large amount of capital at stake. This opinion, however, is not universally held, for an official in a southern city stated that "they are all scoundrels."

Before a supply of general good honest milk can be obtained it will be necessary to have proper legislation. Realizing that there is no other subject concerning which so much legislation is attempted that at the present time, the producer, dealer, and consumer are at a loss as to what will be proposed next. To solve the questions involved, doctors, lawyers, economists, veterinarians, and experts of all kinds, are called in. The opinions of these men vary even on the same question, nor can their opinion be said to have the same object in view—that is, honest, clean, healthful milk. There is also much conflict in selecting the proper body in which shall be vested the right to regulate and control the milk supply. This at times leads to the establishment of different requirements and regulations in the same territory.

Because the milk question is so complicated, and there are so many different views concerning standards and requirements, it seems to me that one of the best methods of solving the problem is to review and study the methods now employed in the various parts of the country. While the laws and rules vary a great deal, they contain features that stand out most prominently as being efficient; and the mere fact that they vary so much is evidence that uniform requirements are not feasible at this time. A study of the regulations shows at least one good method which will open

the way for suggestions leading to a satisfactory solution of the problem. It is certain that our federal government should not regulate the percentage of butter fat in milk or establish other chemical standards. Even in the small area of a state this seems inadvisable. This objection to such standards is valid because of the advantage of using different breeds of cattle in different sections of the country, and because of differences in feed, market, etc. However, local conditions need not prevent state-wide regulation concerning the health and care of the herd, methods of milking, cooling, and all conditions affecting milk up to the time it reaches the place of consumption, or manufacture into other products. The states should adopt the score card system and should license. Each license ought to state whether the milk is suitable for direct consumption, for cheese or for butter making, or for other purposes. These licenses and scores should be published. This will leave with local health boards, as far as milk for direct consumption is concerned, the establishment of standards of percentages of butter fat, solids, and all such chemical constituents as may be desirable, as well as the regulations concerning pasteurization, labeling, standards for cream and skimmed milk, and local sanitary conditions. Then if these regulations are too lax or too stringent the result will be felt in the locality which can most readily change its laws.

DISCUSSION.

Mr. George E. Bolling (Brockton). I have listened with considerable interest to Dr. Schorer's paper, but the only part I feel warranted in commenting on is that relating to the regulations existing in Massachusetts.

A year and nine months ago the Committee on Milk Legislation reported to this Association a set of milk regulations suitable for adoption by both town and city boards of health in Massachusetts. Copies of these regulations were sent to all local boards of health in the state in the hope that a general adoption of such regulations would insure a uniformity that would be of benefit to both health officials and milk dealers. How extensively the regulations, either in whole or in part, have been adopted I cannot say, but I do know that where they have been used, considerable good work has been accomplished, and that no difficulty has been experienced in securing convictions in court for the sale of dirty milk when such a course was deemed necessary. These regulations, backed up by such statute laws as Chapters 405 and 443 of the Acts of 1909, should enable local boards of health in this state to provide a safe milk supply for their respective communities.

I wish to call to the attention of this Association a matter which can very properly be brought up in connection with the discussion of this paper, and that is that there is another phase of board of health work necessary to minimize infant mortality beside the mere making and enforcement of milk regulations, and that phase is the education of the family in the proper care of clean milk after it is left at the door.

In my city, Brockton, we have had sanitary inspection of milk for over five years, and throughout that time we have found milk dealers who were selling ultra clean milk, as market milk goes; dealers who were finishing with an average of below 10,000 bacteria per cubic centimeter as shown by our examinations; and one dealer who for five years has marketed a product averaging but 14,000 bacteria to the cubic centimeter for that period. But death of infants occasionally would occur in families supplied with even this milk. As a consequence the Brockton Board of Health realized that another step was necessary—the teaching of parents the proper care of milk in the home. This seemed a delicate matter to handle, but a four-page circular was drawn up and sent to every home from which a birth was reported. Two pages were devoted to the care and feeding of the infant, one page to the proper care of milk in the home, and the last page was a reprint of the article "Beware of Flies," authorized by this Association. These circulars were first sent out last summer, and while it may be merely a coincidence, we believe the extremely low infant

mortality in Brockton the past summer is due in large part to their influence.

Deaths of infants became so rare that when our local board's weekly reports were received by the State Board of Health they felt impelled to inquire if some mistake had not been made in compiling the reports, but they were met with the assurance that the reports were correct as rendered.

Mr. Ellis. I would like to ask Dr. Schorer how he arrived at the conclusion that it is unwise for the state to establish a chemical standard, and why he believes that it should be a local rather than a state regulation.

Dr. Schorer. The area of some states is so large that the kind of cattle may be entirely different in the different sections of the state. Again, what would be all right for the state of Massachusetts, where most milk goes to direct consumption, would not be right in a state like Wisconsin, where a relatively small amount of the milk produced goes to direct consumption. It would not be necessary to require 3.25 per cent. of fat when 80 per cent. of the milk is used for cheese making. I base my conclusions to some extent on the experience of Germany. In 1882 the attempt was made to establish regulations for all Germany, but it was decided that conditions varied so in different sections in the country that national standards were not advisable. However, in the last year the producers' association asked that the country make sanitary regulations. The reason for this is, of course, that a number of cities draw from the same part of the country, and the fields of operation of the sanitary inspectors overlap, but the establishment of chemical standards would not lead to confusion of this kind.

Dr. Dearing. I hope to see the day when every board of health will have its own bacteriologist and its own methods of making examinations. Bacterial tests are the strongest and best safeguards that the boards of health can possibly secure. In Braintree, three years ago, we appointed a man as bacteriologist and this move has helped to decide questions quickly upon their merits. If we send in our samples to the State Board of Health we possibly wait three or four days, and the delay often causes trouble. The State Board of Health should have absolute authority to stand back of us and see that we get justice, but the local board should be supreme.

I think the Ellis bill would have proved to have been a step in the right direction.

Mr. Ellis. It would seem from the remarks of the gentleman that he thought that the bill which passed the House put the whole control under the State Board of Health, to the exclusion of the powers of the local boards. Section 2 of that bill reads as follows:

"This act and all regulations prepared in accordance with it shall be administered by the State Board of Health, acting through its milk division or other agents, or through the municipal boards of health, or their agents, whom the State Board of Health may constitute its agents for the purposes of this act."

It was intended that the State Board of Health should work through the local boards so far as possible and should secure uniform regulations.

Dr. Davis. The so called long haul and short haul milk touched on in Dr. Schorer's paper is of importance to all interested in milk. Babies are great milk consumers and so the mortality statistics of infants under one year of age tell an interesting story. During July, New York City, with a population of nearly five million people, had an infant death rate per thousand births of about 133; Rochester, with a population of 300,000, had almost the same infant death rate. New York's milk comes three or four hundred miles; Rochester's milk supply is near at hand, yet the two cities had nearly the same infant death rate. Utica, with a population under 100,000 has an infant death rate of about 155, and Hudson, with a population of only 11,000 and a nearby milk supply. had an infant death rate of 333. It is interesting to see that in some of the small towns infant mortality is considerably higher than in the larger cities.

The President. Representing the Massachusetts State Board of Health, I should like to say that the constant policy of that board has been to increase to the utmost the responsibility of the local authorities. So far as I know there has never been an attempt to interfere with any community which is offering proper sanitary protection to its people. We will do all that we can to assist those in authority, and when necessary we will interfere; but we wish to emphasize the fact that our first desire is to increase to the utmost the authority of the local boards and to assist them in their legitimate work.

Mr. Ellis. From this bill I did not read all pertaining to the non-interference with the local boards of health. Part of Section 20 reads:

"Nothing in this act shall affect the right now or hereafter possessed by any city or town to regulate its own milk supply by its own inspectors, or to exclude milk from sale in such city or town which it condemns by its own inspectors, provided that such municipal regulations do not conflict with the provisions of this act or of any regulation made hereunder."

That is to say, the local provisions must not be *less* than those of this bill. The local boards can *exceed* them as much as they wish.

(Adjourned.)

Notes and Reviews*

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Rightmindedness in Sex Matters. Civilization appears to make men tend toward extremes of conduct and sentiment where the facts of sex are concerned. It is often remarked that the animals set us good examples of sexual temperance, and it is probably true that the simpler races of mankind are likewise sounder and saner in this important field of behavior. We know that in the course of history overemphasis upon the sexual functions has corrupted religions, as their overindulgence has contributed to the ruin of empires. But while these facts are only too familiar, it must be admitted that there is an unwholesome tendency among us to the opposite standard of judgment and practice—the minimizing or even the abhorrence of sex. Such a position results clearly from a recognition of desolating evils which are patent to everyone. The impulses prompting to it are primarily those of virtue but they lead readily to false views.

To defend the place of sex in human feeling and its expression is a task not to be undertaken without first giving explicit limitations. Total abstinence for the unmarried is the ideal. If reasons must be given for a requirement so uncompromising, they may be defined under three heads, as prudential, social, and ethical. The order is an ascending one. The danger of venereal disease constitutes a low but positive motive for continence. A more worthy consideration is found in the thought that every man who indulges himself contributes to the degradation and ultimate misery of outcast womankind. Higher still should be the purpose of the young man to come to his wedding-day with no memories that must move him to self-reproach—with a past as blameless as that of the woman who has put her faith in him.

As to marital relations, this difficult subject has seldom been better treated than it was by H. Newell Martin, in the appendix to "The Human Body." In the recent revision of this splendid text book the chapter

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

stands with little change. It is wisely insisted that the husband must expect to exercise restraint, that he must wait strictly upon the pleasure of his wife, and that he is not to anticipate that her propensities will measure up to his own.

Granting all this, one may still condemn the mistaken attitude that sex is an unworthy thing, and that the ideal of refinement and discipline demands the extinction of its impulses. This was the avowed position of the Shakers. It is tacitly held by a great many people. It is fostered by much that is written and taught. A widely read periodical recently published a woman's account of her own courtship, in the course of which the lovers tried the experiment of denying themselves caresses. Shocked to find how much the physical had counted toward the joy of their engagement, they felt that they ought to end it, and resolutely did so. Such rigorous self-analysis is not common, and it is well that it is not. If it were applied widely the results would be tragic, for it would lead again and again to a distrust of motives and a skepticism regarding the possibility of happiness fatal to successful marriage. The attempt is contrary to nature and to Herbert Spencer's vigorous teaching that the first duty of man is to be a good animal.

Sexual emotion, like any other type, may spend its power destructively, but it may also be a force for good. Observing that it sometimes impels to folly and crime, we fail to realize that, in well-balanced lives, it is a source of patience and fidelity, constancy and devotion. To regard it as necessarily opposed to high thinking is almost equivalent to the claims that fullness of physical health is inimical to culture and goodness. We have come to consider the last as a heresy and we ought to reject the first. Writers like Whitman, who have sung the praise of sexuality, shock the sensibilities of some and are ardently admired by others. To the majority of readers their error seems to be a literary rather than a moral one. They are right in urging that sex is worthy and honorable but its details are as inappropriate for setting forth as those of any other physiological matter. Sex, in the physical realm, lends itself as little to poetry as does vasomotor adjustment or pancreatic secretion. But the fine contribution of sex to chastened human feeling has never been better expressed than by John Boyle O'Reilly when he wrote with delicate directness:

> " . . I send you a cream white rosebud
> With a flush on its petal tips;
> For the love that is purest and sweetest
> Has a kiss of desire on the lips."

EPIDEMIOLOGY AND PREVENTIVE THERAPEUTICS.

By CHAS. V. CHAPIN, M. D.,
Health Officer, Providence, R. I.

Dental Caries as the Cause of Enlarged Tonsils. Gibson, School Medical Officer, County Chester, England,* has made a careful study of the occurrence of enlarged tonsils in connection with carious teeth. He finds that in children with sound teeth 1.82 per cent. have marked enlargement of the tonsils. Those with one to four carious teeth have 3.7 per cent. enlargement, and those with more than four carious teeth have 5.3 per cent. enlargement. After correcting for age and probable error he finds that there is a marked correlation between decayed teeth and enlarged tonsils. He critically considers whether the relation between the two may be due to a common cause, or whether the caries may be caused by the enlarged tonsils, or the enlargement of the tonsils may be due to the decayed teeth. He says that the only common cause that has been suggested is hypothyroidism, but he can find no evidence that this is really a cause. He has studied the relation between rickets and diseased tonsils and teeth, but from a study of rickety children he does not consider that the effect of this disease is likely to be of much magnitude. It has been suggested that the teeth may become infected from enlarged tonsils, but Gibson thinks that this is highly improbable, as the tendency would be for infection to pass much more frequently from the teeth to the tonsils than in the opposite direction. He admits, however, "That there seems reason to believe that mouth-breathing, consequent on adenoids or hypertrophy of the tonsils, may have a deleterious effect on the teeth, and this may account in some measure for the association observed between caries and enlargement of the tonsils." In conclusion he says, "We have evidence, therefore, of the existence of a correlation of considerable size between dental caries and enlargement of the tonsils, difficult to explain by the assumption of a common cause; rickets, a likely condition, is found to have no association with tonsillar enlargement; the effect of the mouth-breathing, often seen in children with hypertrophied tonsils, in causing caries is found to have practically no share in the formation of this correlation, and there remains only the direct connection by bacterial action, either an infection of the teeth from the tonsils, or an affection of the tonsils by dental caries, owing to saturation with bacteria and with toxins; the evidence points to this latter connection having by far the greatest share in building up the association."

* The Medical Officer, 1911-12, VI, 87.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Boston, Mass.
(*Reviewer.*)

The Cholera Situation.* There has been little change in the cholera situation during the past week (Oct. 22). The disease continues prevalent in Italy. Limited outbreaks continue to be reported in various localities in Austria-Hungary. The disease is present at various points in Russia, although to a much more limited extent than during the autumn of 1910. The disease is also present in Turkey in Europe, and an increasing number of cases are occurring in Asia Minor. The outbreak in Tunis is increasing. According to last advices the disease was still present at Marseilles, France.

Precautions for the protection of the United States are being continued. Officers of the Public Health and Marine-Hospital Service are being retained at foreign ports at which emigrants from cholera-infected localities embark for the United States, and the examination of immigrants on arrival at United States ports for the detection of cholera carriers is still being carried on.

Typhoid Investigation at Fort Smith. Dr. W. H. Frost, P. A. Surg. P. H. & M. H. Service, reports† an investigation into the origin and prevalence of typhoid fever at Fort Smith, Arkansas, in which he found 50 per cent. of the cases due to contact, and the balance due to various causes.

Proceedings of Michigan State Board of Health.‡ The Michigan State Board of Health has employed Miss Adele McKinnie, an expert investigator in eugenics from the Eugenics Record Office, Cold Spring Harbor, Long Island, N. Y., as a special medical inspector, to investigate, during the next six months, into the condition and extent of feeble-mindedness and mental deficiency in Michigan. Miss McKinnie's work will begin at the State Home for the Feeble-Minded and Epileptic, at Lapeer, Michigan, under the immediate direction of Dr. George S. Chamberlain, Medical Superintendent of that institution.

With the especial approval of Governor Osborn, the State Board of Health authorized the Secretary to bring about an investigation of the occupational conditions in Michigan, with a view to preventing unnecessary loss of life and health from conditions that can be remedied. This work is to have the immediate attention of the department, and a thorough investigation is to be made of all industrial conditions that affect health and life.

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* Public Health Reports, October 20, 1911.
† Public Health Reports, October 27, 1911.
‡ Communication from the Secretary, Dr. R. L. Dixon.

ANNOUNCEMENTS.

American Public Health Association.
Preliminary Program—Havana Meeting.

The program of the Havana meeting will be of more than usual interest. The following papers have already been promised, and these, together with the committee reports, will make it worth while for any member of the Association to attend. Additional papers will doubtless be received later.

General Association.

Symposium on Cholera.

On Measures Taken by the Canadian Government to Prevent the Introduction and Spread of Cholera in the Dominion of Canada, by Dr. Frederick Montizambert, Director-General of Public Health, Canada.

On Measures Taken by the Cuban Government to Prevent the Introduction and Spread of Cholera in Cuba, by Dr. Juan Guiteras, Director of Health, Cuba.

Measures Adopted by the United States Government to Prevent the Introduction of Cholera into the United States in the Summer of 1911, by Dr. John F. Anderson, Director, Hygienic Laboratory, United States Public Health and Marine-Hospital Service.

Symposium on Tuberculosis.

Dr. Livingston Farrand, Chairman of Committee, Executive Secretary, National Association for Study and Prevention of Tuberculosis, New York.

Symposium on Hookworm Disease.

Dr. John A. Ferrell, Assistant Secretary for Hookworm Disease, North Carolina State Board of Health.

Dr. Bailey K. Ashford, Medical Department, United States Army, Porto Rico Anemia Commission.

Dr. Ch. Wardell Stiles, Chief, Division of Zoology, United States Public Health and Marine-Hospital Service, Scientific Secretary of the Rockefeller Sanitary Commission.

Tropical Diseases in Cuba, by Dr. Enrique B. Barnet, Chief Editor, Department of Sanitation and Charities.

How to Control Communicable Diseases, by Dr. Charles A. Hastings, Medical Health Officer, Toronto, Canada.

Annual Report on Yellow Fever in the Republic of Mexico, by Dr. Eduardo Liceaga, President, Superior Board of Health, Mexico.

Typhoid Fever in Havana, by Dr. Jose A. L. del Valle, Chief Health Officer, Havana, Cuba.

Typhus Fever, in Mexico, by Dr. Jesus E. Monjaras, Secretary-General, Superior Board of Health, Mexico.

Studies of Rural Typhoid Fever in Virginia, by Dr. Allen W. Freeman, Assistant Commissioner of Health, State of Virginia, and Dr. L. L. Lumsden, United States Public Health and Marine-Hospital Service.

Infantile Paralysis, by Dr. Mark W. Richardson, Secretary, Massachusetts State Board of Health.

A Study of Air and Contact Infection at the Providence City Hospital, by Dr. Chas. V. Chapin, Superintendent of Health, Providence, R. I.

On the Milk Problem, by Dr. Ernesto Aragon, Cuba.

The Conservation of Food Products by Refrigeration in its Hygienic and Economic Aspect, by Dr. P. H. Bryce, Chief Medical Officer, Department of the Interior, Canada.

Methods of Sludge Disposal, by Mr. Rudolph Hering, New York, N. Y.

A Device for Keeping Garbage Cans in Place, by Dr. M. E. Connor, General Inspector, Isthmian Canal Commission, Ancon, C. Z.

Sewage Disposal in Saskatchewan, by Dr. M. M. Seymour, Medical Health Officer, Province of Saskatchewan, Canada.

Disposal of Refuse, by Dr. Eugenio S. Agramonte, Cuba.

Disinfection in Havana, by Dr. Gabriel Custodio, Chief Officer of Disinfection, Havana, Cuba.

A Few Hints on Vital Statistics, by Dr. Jorge Le Roy, Chief Statistician, Department of Sanitation and Charities, Cuba.

Passenger Inspections, by Dr. Antonio Cueto, Special Medical Inspector, Havana, Cuba.

House to House Inspection, by Dr. Federico Torralbas, Chief of Sanitary Inspection, Havana, Cuba.

History of the Adoption on the American Continent of Bertillon's Nomenclature, now International, of Causes of Deaths and Disease, by Dr. Jesus E. Monjaras, Secretary-General, Superior Board of Health, Mexico.

Laboratory Section.

FIRST SESSION.

Chairman's Address—Problems of the Future, Dr. John A. Amyot.

Disinfectants:

1. Further Observations on the Chemistry of Disinfectants, by Dr. Wm. Dreyfus, New York City.
2. Experimental Studies on the Action of Germicides, by Dr. E. C. Howe, New York, N. Y., Introduced by E. B. Phelps, New York City.
3. Further Work with the Hygienic Laboratory-Phenol Coefficient, by Dr. John F. Anderson and Dr. Thomas B. McClintic, U. S. P. H. & M. H. Service, Washington.
4. Report of Committee on Standard Methods for the Bacterial Examination of Disinfectants, by E. B. Phelps, Chairman, New York City.

SECOND SESSION.

Vaccine Virus.

1. The Preparation of Dried Vaccine Virus, by Dr. W. F. Elgin, Glenolden, Pa.
2. Report of Committee on Standard Methods for Preparing Smallpox Vaccine, by Dr. J. H. Huddleston, Chairman, New York City.

Rabies.

3. Further Studies on the Virulence of Desiccated Rabic Material, by Dr. D. L. Harris, St. Louis.
4. Report of Committee on Standard Methods for the Diagnosis of Rabies, by Dr. V. A. Moore, Chairman, Ithaca.

Syphilis.

5. Report of Committee on Standard Methods for the Biological Diagnosis of Syphilis, by Dr. Herbert U. Williams, Chairman, Buffalo, New York.

Glanders.

6. Report of Committee on Standard Methods for the Bacterial Diagnosis of Glanders, by Dr. W. L. Beebe, Chairman.

Tuberculosis.

7. Report of Committee on Standard Methods for the Bacterial Diagnosis of Tuberculosis, by Dr. Mazyck P. Ravenel, Chairman, Madison, Wis.

Water.

8. Report of the Committee on Standard Methods for the Bacterial Analysis of Water and Sewage, by Mr. D. D. Jackson, Chairman, New York City.
9. Preservation of Water Samples by Salting, by Drs. Mazyck P. Ravenel and K. W. Smith, Madison, Wis.
10. The Hygiene of Swimming Pools, by Mr. E. J. Tully, Madison, Wis.
11. Report of the Committee on Standard Methods for the Chemical Analysis of Water and Sewage, by Mr. Robert Spurr Weston, Chairman, Boston.
12. Composition of Gases Formed by Decomposition of Organic Matter, by R. H. Jesse and E. Bartow.

Milk.

13. An Inspector's Inexpensive Outfit for the Collection of Bacterial Milk Samples, by Dr. F. O. Tonney, Chicago.
14. A Portable Apparatus for the Determination of Visible Dirt in Milk, by Dr. F. O. Tonney, Chicago.
15. Report of the Committee on Standard Methods for the Bacterial Examniation of Milk, by Dr. Francis H. Slack, Boston.
16. Report of the Committee on Standard Methods of Chemical Milk Analysis, by Mr. J. O. Jordan, Boston.

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17. Report of the Committee on Standard Methods for the Examination of Air, by Mr. C.-E. A. Winslow, Chairman, New York City.
18. Report of the Committee on Mailing Infectious Material, by Dr. M. L. Price, Chairman, Baltimore.

THIRD SESSION.

1. Report of the Committee on Standard Methods for the Bacterial Diagnosis of Typhoid Fever, by Dr. Allen W. Freeman, Richmond, Va.
2. Report of the Committee on Standard Methods of Preparing Diphtheria Antitoxin, by Dr. P. G. Heinemann, Chairman, Chicago.
3. Report of the Commitee on Standard Methods of Preparing Tuberculin and Mallein, by Dr. Marion Dorset, Chairman, Washington.
4. Report of the Committee on Standard Methods for the Bacterial Examination of Shellfish, by Mr. G. C. Whipple, Chairman.
5. Miscellaneous business.

No information has been received relative to the programs of the Section on Vital Statistics and the Municipal Health Officers Section, but it is understood that the program committee of each of these Sections has been actively at work and that papers and committee reports will be up to the standard heretofore set by these Sections.

Members of the Association having papers, reports, or other matters that they want to bring before the Association or before any of the Sections are requested to submit them as soon as possible to the Secretary of the Association, or, if it relates to the work of any Section, then to submit it to the proper officer of the Sections named below. In every case, if possible, an abstract of the paper or report that it is proposed to present should be sent to the chairman of the proper program committee at least thirty days before the meeting, so as to permit the arrangement and printing of the program before the Association meets.

General Association—Dr. Wm. C. Woodward, Secretary, Washington, D. C.

Laboratory Section—Dr. John F. Anderson, Chairman, Committee on Program, Washington, D. C.

Vital Statistics Section—Dr. John S. Fulton, Chairman, Committee on Program, Washington, D. C.

Municipal Health Officers Section—Dr. Federico Torralbas, Chairman, Committee on Program, Havana, Cuba.

Sociological Section—Mr. John M. Glenn, Chairman, 105 East 22nd St., New York, N. Y.

Sanitary Engineering Section—Col. J. L. Ludlow, Chairman, Winston-Salem, N. C.

If no formal meetings of the Sociological and Sanitary Engineering Sections are held, places for papers intended primarily for presentation to those Sections will be found in the program of General Association or in the program of one of the other Sections.

Committee Meetings. The Committee of Seven, the Executive Committee, and the Committee on Membership will meet on Monday, December 4, 1911, at hours and places to be announced hereafter.

EXHIBIT.

The Department of Sanitation of Cuba will have an exhibit of its various methods and appliances of sanitary interest. It is hoped that Mexico and the Canal Zone may also be represented.

RAILROAD AND STEAMSHIP RATES.

No special rate to Havana has been granted, except that given by the Ward Line, sailing from New York. Members of the Association desiring to go to and from Havana over that route can leave New York on Wednesday, November 29th, on the Steamship Morro Castle, which will reach Havana on the following Sunday evening or Monday morning. Originally, and the announcements sent out by the Ward Line so stated, return on these special tickets was permitted only on the boat leaving Havana on

December 9th. The steamship company has, however, agreed to extend the return portion of round trip tickets until any time in December. The limit will be the last sailing from Havana to New York, which will be on Saturday, December 30th. If any members of the Association prefer to return to New York through Santiago, via Nassau, the Ward Line has expressed its willingness to take the matter up and meet their wishes by making special arrangements for them. Address: New York and Cuba Mail Steamship Company, Pier 14, East River, New York. Reservations should be made as promptly as possible to insure against disappointment.

For information as to railroad routes and rates, members are advised to inquire of their local ticket agents.

HAVANA NOTES.

PLACES OF MEETINGS. The headquarters of the Association will be at the Hotel Sevilla. The general meetings will be held in the rooms of the Ateneo and Circulo de la Habana. The Laboratories and the University will be used for the meetings of the Laboratory Section. Suitable accommodations will be provided for the Section on Vital Statistics and for the Section of Municipal Health Officers.

ENTERTAINMENT. Through the courtesy of the people of Havana, ample entertainment has been provided, arranged, however, with due regard to the business and scientific meetings of the Association. The main social features will be a trip to a tobacco plantation, a banquet at the National Theater, a picnic on the grounds of la Tropical Brewery, a Spanish-Cuban Verbena at the Hotel Sevilla, a trip to Morro Castle, Cabanas, and Triscornia Detention Camp, and a visit to the "Maine."

HOTEL ACCOMMODATIONS. Hotels available for members of the Association and others attending the meeting, are:

HOTEL SEVILLA. Headquarters of the Association—European plan, $2.00 up. American $5.00. Bath and telephone in every room.

HOTEL INGLATERRA. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

PLASA HOTEL. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

HOTEL PASAJE. European plan, $2.00 up. American $4.00 up. Bath and telephone in every room.

HOTEL TELEGRAFO. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

Reservations may be made by writing directly to the hotels named or to the Secretary of the Local Committee on Arrangements, Dr. Federico Torralbas, Tejadillo, 36, Havana, Cuba.

COMMUNICATIONS.

A SANITARY INSTITUTE FOR AMERICA.—A WORD OF ENDORSEMENT.

To the Editor:

After reading the article by P. B. Tustin in the June number of the Journal of the American Public Health Association, I hoped that a number of the public health officials of America would voice their views of the question discussed by him. It seems to me a matter of great importance that such a sanitary institute should be founded for America, especially since in the United States there is no federal body with authority to certify to the qualifications of health and sanitary officers.

It is my personal belief that state health organizations will eventually be organized on much the same plan as those of our large cities; that they will be organized as departments under commissioners, and will succeed in large measure to the powers and duties now exercised by the local boards of health of small cities, towns and rural districts. I can see no more reason for each little town or each county maintaining a separate health organization than for each ward of a city doing so. We need better qualified men, and men whose interest is in public work rather than in private practice. To get the full time of such men means increased salaries; to give such men something to work with means increased appropriations; and to ask each small city, town, or county to provide such increased grants of money is asking for what they will not, and probably should not, give.

If the local control be surrendered to the state, the size of the sanitary unit can be increased, a few thoroughly competent men can be employed to direct the health affairs of the district, with a number of lay inspectors and visiting nurses working under them. We are centralizing our organizations for the collection of vital statistics, after failing uniformly to obtain satisfactory results under local systems with loose central direction. Why not centralize in other lines?

The answers to this have been: (1) The insecurity of tenure, and (2) the danger of the department coming under political control and being misused for political purposes. The preventive for both these contingencies is a civil service and because in many of our states there are few, if any, who are competent to judge of the qualifications of applicants, I believe a capable central body, which will certify to the qualifications of all candidates for positions in public health departments, is a necessity of the greatest importance.

The idea of a sanitary institute for America appeals to me forcibly, and I desire to endorse it.

EDWARD. L GODFREY, JR.
Superintendent of Public Health, Arizona.

BOOK REVIEW.

Public Hygiene, by Thomas S. Blair, M. D., Neurologist, Harrisburg, Pa., Hospital, author of "The Practitioner's Handbook of Materia Medica" and "The Practitioner's Handbook of Modern Medical Treatment, Etc." Assisted by numerous contributors. In two volumes. 158 illustrations. Richard G. Badger, The Gorham Press, Boston.

"This book," says the author in his preface, "is the personal investigation of public hygiene from the standpoint of a seasoned general practitioner." From his survey of public hygiene he has discovered that the subject "has developed too much as a specialty and needs the tempering conclusions of the whole body of the medical profession." "The great American public having joined hands with the doctor, this medical book aims to present what the intelligent laymen are doing, and offers for their study much that is of joint interest to them and to the physicians." For, "so far as ascertained, this is the first effort to present a work upon this especial point of view in the great domain of public health."

There are sixteen contributors to the work, twelve collaborators, not including a committee of the Harrisburg, Pa., Academy of Medicine, while many individuals and organizations have supplied data, reprints, reports, etc., or have delegated assistants to aid the editor.

This book consists of pages of generalities, interspersed with several good chapters, notably those on the "Slums and Town Nuisances," by J. Horace McFarlin, and "Special Rural Hygiene and Sanitation," prepared from numerous reports of organizations and departments. The hygiene and sanitation taught in the book may be judged by the following quotations:

We are taught that "churches, schools, the Mayor's office and the city library have all been closed for fumigation, when any public danger was apprehended"; that "hospitals should disinfect rooms regularly every three months"; that "in time of serious epidemic it is necessary to close the places of public gathering for a short time and to fumigate and disinfect well before opening to the public."

In the treatment of epidemics the author says: "In our elaborated civilization, the facilities for preventing epidemics are so efficient, that the danger of attacks of contagion are so slight that an undue degree of excitement is often worked up." We are also told, that "cellar air is largely the house air, and much sickness is caused by cellar air."

In the chapter, "School Inspection and College Sanitation," we are told that "the primal object of medical inspection is the daily visitation for the detection of communicable diseases," and that "one physician devoting from one to two hours each school day and assisted by one nurse, can take care of from 6,000 to 8,000 pupils during an ordinary school year." "The nurse in administration must be under the inspector (medical school). In brief, her work consists of clerical duties."

The registrars of vital statistics will doubtless be interested in "The seaside resorts are the most healthy in the world as regards permanent population," and

"the *Proper** death rate is among the lowest." This doubtless has a relation to the man who wrote a death certificate: "Died from an overdose of Rough on Rats."

We are told that "Cornell (?) Pennsylvania and Michigan train health officers." No mention is made of the work of Harvard, and Cornell, of course, has no training for health officers. The course referred to is, doubtless, the course of Sanitary Science for Students.

We are told, too, that "the cough prescribed for develops into whooping-cough."

The book is loose in statement; has such expressions as "put on a front"; is without plan, and has a small place in the history of hygiene and sanitation.

GEO. W. GOLER.

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*Italics in original.

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Dr. Walter Wyman.

Surgeon-General Walter Wyman of the Public Health and Marine-Hospital Service, died in the Providence Hospital, November 21, 1911, as a result of a carbuncle, brought about by a complication of diseases. General Wyman was born in St. Louis, August 17, 1848. He graduated from the City University of St. Louis in 1866, Amherst College in 1870, St. Louis Medical College in 1873, and received the honorary degree of Doctor of Laws from the University of Pennsylvania in 1897, from the University of Maryland in 1907, and from Amherst in 1911.

After the completion of a tour of duty in the St. Louis hospitals he entered the Marine Hospital Service in 1876, and was in charge successively of the stations at St. Louis, Cincinnati, Baltimore, and New York, and of the Quarantine and Purveying Divisions of the Bureau at Washington.

In 1892 General Wyman was made Supervising Surgeon-General, and Surgeon-General in 1902, which position he held until his death. During the intervening years there were passed at his instance a number of important laws for the protection of the public health, and the service of which he was the head was reorganized on broad lines, and developed to its present state of high efficiency. Among the notable movements with which he was connected were measures for the relief of deck hands on western rivers, the affording to consumptive sailors of the benefits of the high, dry climate

of the southwest, the establishment and development of the Hygienic Laboratory, the assumption by the federal government of adequate quarantine protection, the establishment of a station for systematic investigations of leprosy, the inauguration of governmental inspections of establishments manufacturing viruses, serums, and toxins, and the extension of research on contagious and infectious diseases affecting the public health. During this period also there occurred a number of epidemics of which General Wyman had administrative oversight, the actual field measures being in the hands of his fellow officers.

In addition to national measures for the protection of health General Wyman was interested in international sanitation, and especially of seaports, with a view to lessening quarantine restrictions. Largely through his efforts there was brought about an international sanitary agreement between the republics of the western hemisphere for the control of cholera, plague and yellow fever. Through his influence also five biennial conferences have been held by delegates from the various American republics.

General Wyman was a member of the American Public Health Association, and served as its president in 1902. He was also a member of the following organizations: The Association of Military Surgeons, American Medical Association, American National Red Cross, National Association for the Study and Prevention of Tuberculosis, National Association for Mental Hygiene, American Academy of Medicine, American Association for the Advancement of Science, American Climatological Association, American Society of Tropical Medicine, and the local medical societies in the city of Washington. In many of these he held prominent offices, and took an active part. In addition, he represented the United States in a number of important international meetings, having been the president of the First and Second International Sanitary Conferences of the American Republics.

In the death of Surgeon-General Wyman the country has lost a servant who labored long and faithfully in its interest. By reason of the position which he occupied, it was his privilege to be closely identified with public health affairs during a formative stage. As a result of his labors the cause of sanitation has been advanced, and the public health work of the nation rests on a firmer foundation. There will undoubtedly be great development of health administration in the future, and it will serve to perpetuate the influences exerted by him and others to that end.

EDITORIALS

NATIONAL HEALTH LEGISLATION.

MUCH has been said and written within the last two years concerning the attitude of Congress toward promoting increased federal health activities. Not less than six bills have been introduced during the past two sessions. The majority of these bills provide for the concentration of all existing federal health agencies into one department, to be known as the Department of Public Health, under the supervision of a secretary who shall be appointed a cabinet officer by the President.

When it is remembered that the Public Health and Marine-Hospital Service is under the supervision of the Treasury Department, that the Bureau of Pure Food and Drugs is located in the Department of Agriculture, and that the Division of Vital Statistics is in the Department of Commerce and Labor, it will be readily understood that there now exists a lack of coördination and effectiveness in the work relating to human health and sanitation, which, in the language of the Commission on the Organization of the Scientific Work of the Government appointed by President Roosevelt, "can only be overcome by administrative supervision in one department."

One of the most comprehensive measures looking toward this end was introduced February 1, 1910, by Senator Owen and was known as S. 6049. This bill and his stirring address in the Senate aroused both enthusiastic support and opposition. It is difficult to conceive why there should be any opposition to a wise and humane measure. Nevertheless a well organized faction appeared not only at the hearings before the Senate Committee on Public Health but also manifested itself by paid newspaper advertisements which contained misleading statements designed to convince readers that the Owen Bill proposed to establish a department of healing, that only doctors of one school of medicine would be allowed to practice, and that the "medical freedom of all other schools would be restricted." Some of the opponents claimed that such legislation would interfere with states rights, others maintained that the taxpayers were interested on the score of economy. It was suggested by the advocates of the bill that the real motives of the opposition had not been disclosed, but were similar to those which opposed the enactment of the pure food and drug law and the efficient work of the postoffice fraud order department. Of course we may expect opposition from unscrupulous parties, who now prey upon suffering humanity and whose guilty consciences tells them that any real health movement will seriously interfere with the sale of "nostrums." Their cry

is an old one and well understood. "License they mean when Liberty they cry." Such mean and selfish motives from men, who, according to the British Medical Journal, "have destroyed more than the sword, famine and pestilence united" should only serve to emphasize the need of progressive legislation. In some instances, however, the opposition is based evidently upon a misconception of the true object of the proposed legislation; at all events the cry for "medical freedom" has been caught up by a number of well meaning and unsuspecting people. These groundless fears were pointed out by a number of speakers at the hearings and also by President Taft in his message to Congress in December, 1910, when he wrote "It seems to me that this assumption is wholly unwarranted and that those responsible for the government can be trusted to secure in the personnel of the bureau the appointment of representatives of all recognized schools of medicine, and in the management of the bureau entire freedom from narrow prejudice in this regard."

Senator Owens, on April 6, 1911, introduced at the special session a bill known as S. 1, which makes it perfectly clear that the proposed Department of Health shall recognize no so-called school or system of medicine. (Extracts from this bill are here reproduced in order to give a complete understanding of the proposed legislation).

A BILL

TO ESTABLISH A DEPARTMENT OF HEALTH, AND FOR OTHER PURPOSES.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled:

That there be at the seat of government an executive department known as the Department of Health, and a Director of Health, who shall be the head thereof; and the provisions of title four of the Revised Statutes, including all amendments thereto, are hereby made applicable to said department. The Director of Health shall be appointed by the President, by and with the advice and consent of the Senate, at a salary of dollars per annum and with tenure of office like that of the heads of the other executive departments. * * *

SEC. 2. That there be in the Department of Health an assistant to the Director of Health, designated and known as the Commissioner of Health, who shall be a skilled sanitarian, appointed by the President, by and with the advice and consent of the Senate, who shall serve at the pleasure of the President, and who shall receive a salary of dollars per annum. The Commissioner of Health shall preform such duties as are required by law and such as are prescribed by the Director of Health. * * *

SEC. 3. That it be the province and duty of the Department of Health to foster and promote all matters pertaining to the conservation and improvement of the public health and to collect and disseminate information relating thereto; *Provided,* That this Act shall not be construed as attempting to authorize the Department of Health to exercise or attempt to exercise, without express invitation from the chief executive or other proper authority of the State, any function belonging exclusively

to such State, or to enter any premises in any State without the consent of the owner or occupant thereof; but the Director of Health, upon request of the chief executive or other proper authority of any State, Territory, the District of Columbia, or any insular possession, may detail for limited periods an officer or officers, employee or employees, from the Department of Health to assist the health authorities of such State, Territory, District, or insular possession in protecting and promoting the health of the people of such jurisdiction: *And provided further*, That the Department of Health shall recognize no so-called school or system of medicine.

SEC. 4. That to the Department of Health are hereby transferred the following bureaus, divisions, and other branches of the Government, and all that pertains to them, and they and each of them shall remain under the supervision and direction of the Director of Health until otherwise directed by law, namely:

(a) From the Department of the Treasury is transferred the Public Health and Marine-Hospital Service.

(b) From the Department of Agriculture is transferred that part of the Bureau of Chemistry charged with the investigation of the adulteration of foods, drugs, and liquors, and with the execution and enforcement of the Act of Congress entitled "An Act for preventing the manufacture, sale, or transportation of adulterated or misbranded or poisonous or deleterious foods, drugs, medicines, and liquors, and for regulating traffic therein, and for other purposes," approved June thirtieth, nineteen hundred and six.

(c) From the Department of Commerce and Labor is transferred the Division of Vital Statistics, Bureau of the Census.

And the President is hereby authorized to transfer to the Department of Health at any time either the whole or any part, as to him may seem best, of any bureau, division, or other branch of the Government engaged in work pertaining to the public health, except the Medical Department of the Army and the Bureau of Medicine and Surgery of the Navy.

And each and every function, authority, power, duty, and jurisdiction, of whatsoever character it may be, vested at the time of any transfer aforesaid in the head of the executive department from which such bureau, division, or other branch of the Government is transferred, shall, to the extent to which such function, authority, power, duty, or jurisdiction pertains to such bureau, division, or other branch of the Government, immediately upon such transfer become vested and thereafter remain vested in the Director of Health. * * *

SEC. 5. That within the Department of Health there shall be the following bureaus:

(a) Bureau of Sanitary Research; (b) Bureau of Child Hygiene; (c) Bureau of Vital Statistics and Publications; (d) Bureau of Foods and Drugs; (e) Bureau of Quarantine; (f) Bureau of Sanitary Engineering; (g) Bureau of Government Hospitals: (h) Bureau of Personnel and Accounts. And the Director of Health is hereby authorized to arrange and rearrange from time to time, with the approval of the President, the functions, duties, personnel, papers, records, and property, and the work, resources, and equipment generally, coming into the jurisdiction and control of the Department of Health by the operation of this Act, so as most efficiently and economically to organize and maintain the several bureaus herein named and such divisions and offices thereof as to said director seems proper; but in arranging and rearranging the personnel, the rank, pay, and allowances of the officers of the Public Health and Marine-Hospital Service commissioned at the time of the transfer of that

service to the Department of Health shall not, by reason of anything in this Act contained, be diminished. And the Director of Health may call upon the heads of other executive departments for information in their posession whenever such information is needed for the efficient and economical working of the Department of Health.

SEC. 6. That the President is hereby authorized to detail officers and employees from any of the several executive departments of the Government for duty under the Director of Health when so requested by said director, and to detail officers and employees in the service of the Department of Health to any of the other executive departments upon request of the head of such department, provided such detail can be made without prejudice to the public service, to carry into effect the purpose and intent of this Act; but officers and employees so detailed shall receive no additional compensation, but shall be paid such actual and necessary expenses as they incur in the discharge of their duties.

SEC. 7. That the Director of Health may, in his discretion and with the approval of the President, appoint an advisory board of not more than seven members, to confer with him upon his request, from time to time as he deems necessary, concerning the work of the Department of Health and the health of the people. The members of said board shall be selected because of their special knowledge of matters relating to the public health, and each shall hold office for a term of seven years or until his successor is appointed, except that the appointments first made, and appointments thereafter made to fill unexpired terms and terms of members who have held over beyond the periods of their original appointments, shall be made so that not more than one member shall retire during any one fiscal year. No member of any such advisory board shall receive any compensation for his services, but each shall be paid all actual expenses necessarily incurred in the discharge of his duties. And from and after the passage of this Act the advisory board for the Hygienic Laboratory created by section five of an Act entitled "An Act to increase the efficiency and change the name of the United States Marine-Hospital Service," approved July first, nineteen hundred and two, be, and the same hereby is, abolished.

SEC. 8. That the Director of Health may, whenever in his judgment public interests would be promoted by so doing, invite the duly constituted health authorities of all or of any of the States, Territories, the District of Columbia, and insular possessions as to him may seem advisable, each to send one delegate to confer with him or his duly appointed representative or representatives and with each other, at such time and place as he may designate, concerning any particular matter or matters relating to the public health; and it shall be the duty of the Director of Health, upon the written application of the duly constituted health authorities of not less than five States, Territories, the District of Columbia, or insular possessions, stating the particular matter or matters which it is desired to consider, to appoint a time and place, and to call a conference of the health authorities of the States, Territories, the District of Columbia, and insular possessions that united in the request therefor, and personally or through his duly appointed representative or representatives to be present at such conference; but every State, Territory, the District of Columbia, and insular possession shall be notified of every conference, and if practicable be afforded an opportunity of being present and participating in its proceedings. And from and after the passage of this Act annual and other conferences of State and Territorial boards of health, quarantine authorities, and State health officers, provided for by section seven of an Act entitled "An Act to increase the efficiency and change

the name of the United States Marine-Hospital Service," approved July first, nineteen hundred and two, be, and the same are hereby, abolished.

SEC. 9. That, except as expressly provided in this Act, nothing herein contained shall be construed as limiting or abrogating any function, right, or duty imposed by law upon any existing bureau, division, or other branch of the Government; but such bureaus, divisions, and other branches of the Government as are by this Act or by authority thereof transferred to the Department of Health shall continue, under direction of the Director of Health, to have such functions, duties, and rights as they have at the time of such transfer; and in the case of such bureaus, divisions, and other agencies of the Government as are transferred in part only, the part not transferred shall continue to have and to exercise all such functions, duties, and rights, except such as specifically relate to the part transferred to the Department of Health, in the same manner and to the same extent as if no such transfer had been made.

SEC. 10. That the Director of Health shall annually submit to Congress a report in writing showing the operations of the Department of Health during the last preceding fiscal year, which report shall give an account of all moneys received and all moneys disbursed on account of such operation. He shall make such other reports from time to time as may be required by the President, or by either House of Congress, and such as are in his judgment necessary or expedient. * * *

The provisions of the bill appear to us reasonable and satisfactory and if enacted we may confidently expect: (1) Investigation and regulation of health and sanitary matters. (2) Coöperative experimental work with state health departments in some such relation as now exist between the national and state agricultural experimental stations. (3) The training and employment of experts in sanitary science who can both increase and diffuse knowledge bearing on the preservation and improvement of the health of the people. (4) The diffusion of this knowledge not only among the several departments of the federal government and state health officials, but also among the people in the same manner as Farmer's Bulletins are now being issued.

Congressman Mann introduced in the House a bill to change the name of the Public Health and Marine-Hospital Service to the Public Health Service and to enlarge its scope. We fully agree with the sentiments expressed by Senator Owen when he said in the Senate:

"We have had bureaus affecting the public health for one hundred years. They are scattered in eight departments. They have been disconnected and without coöperation. They have even been jealous of each other, one nullifying and hampering the work of another. They have been without a responsible head because of this subdivision and because the chief of the most important of these bureaus, the Surgeon-General of the Public Health and Marine-Hospital Service, can not express an opinion or give information until he has consulted the Secretary of the Treasury—a system that is absolutely ridiculous."

The Secretary of the Treasury was not selected as a cabinet officer because of his knowledge of the public health, but because he was an expert on finance. At present our cabinet expert on finance directs government activities in controlling bubonic plague, and the board of trade and a few commercialized physicians of San Francisco would be more important in his eyes, in all human probability, than the chief of one of his subordinate bureaus; at all events this was true as to a previous Secretary."

There can be no reasonable doubt that the plague situation on the Pacific Coast would have been more efficiently handled, and vast sums of money would have been saved by the government and the State of California, if the chief of the Public Health Service had been under the direction of a secretary qualified to estimate the tremendous risks incurred by inactivity when the plague first gained a foothold in San Francisco. We further believe that this was not the only occasion when General Wyman has felt the need of an immediate superior who could appreciate the special needs and activities of his excellent bureau. The recent developments in the department of agriculture plainly reveal the difficulties and humiliation Dr. Wiley has had to contend with in the execution of the pure food and drug act. In the mean time, and because of a lack of proper coöperation by his immediate superiors and associates, the health and pocket-book of the consumer has suffered. Indeed those who have followed the recent congressional investigation will find a striking confirmation of Dr. Wiley's significant statement to the senate committee in May, 1910, when in answer to Senator Smoot's question whether if any question arose affecting that particular work in his charge, his advice would be accepted by the Secretary of Agriculture, Dr. Wiley replied—"*No; I am not so sure about that. In numerous instances it has been rejected and the advice of a person who had had no training in sanitation has been accepted over mine.*"

Surgeon-General Wyman at the same hearing stated "I have always had in mind that ultimately we should have a department of public health with a secretary in the cabinet, and I have always had that desire in mind—and I have never opposed a department of health. I wish to say that I am in favor of it." In reply to the following question by Senator Owen "General, I wanted to ask if a department should be established, and the bureau over which you preside should be transferred to it, do you think its efficiency would be largely increased?" the Surgeon-General answered "Increased over what it is now? Yes sir."

It seems to us the opinion of the two most prominent government sanitarians should carry great weight in guiding our congressmen in evolving a plan of legislation adequate in scope and commensurate with the importance of the subject.

It is therefore a matter of painful surprise that a prominent member of the Committee on Interstate and Foreign Commerce, to which all National Health Bills are referred, on February 11, 1911, said on the floor of the House—"Such a department is not needed and it would be very much to the disadvantage of the Government to have a department of health in my judgment."

This statement is almost incredible in view of the fact that the United States already employs a large number of sanitary experts and expends millions of money annually in this work. The proposed legislation, by concentrating all existing federal health agencies into one department, will doubtless result not only in increased efficiency, but also in decided economy, and is clearly in accordance with the recommendations of a committee appointed by the National Academy of Sciences pursuant to a request from Congress.*

The truth of the matter is that there should be in the House a Committee on Public Health for the consideration of all such legislation. Our national Senators and Representatives are busy men, and it can be said without derogation to any of them, that but few, if any, ever master all the details and intricacies of government. A Senator or a Representative who is assigned to a committee becomes, however, a specialist in so far as relates to the work of that committee. So if there were in the House of Representatives, a Committee on Public Health, we would soon have in that body a group of specialists with respect to this important branch of government activity. As matters now stand, in the House of Representatives bills relating to the improvement of the federal public health service are referred to the Committee on Interstate and Foreign Commerce, and however expert the members of this committee become with respect to matters of commerce, and it must be admitted that they do become fully informed with respect to it, seldom, if ever, does a member of that committee become an expert with respect to public health so as to view it from a standpoint broader than that of interstate commerce. For this reason a Committee on Public Health, to which bills relative to the health of the people might be referred, is regarded as highly desirable.

In view of the foregoing it seems to us an opportune time for the friends of public health legislation to explain to their senators and representatives why there should be in the House a committee devoted to this matter. The highest aim of scientific medicine today is the eradication of preventable disease, and in the solution of this problem all men who have the interest of the human race at heart can and do unite regardless of medical schools or creeds.

GEO. M. KOBER, M. D.

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* See Doc. No. 1337, 60th Congress, 2nd Session, January 16, 1909, pp. 3-4.

PRACTICAL SUGGESTIONS FOR RAISING THE STANDARD OF MUNICIPAL HEALTH OFFICERS.

THE tremendous growth of preventive medicine in the last decade, together with the great additions to popular knowledge of health questions, have continued to greatly increase the importance and responsibilities of the health officer. The wide-spread campaign against tuberculosis has taught the people many lessons, aside from the methods by which tuberculosis is spread, and has given great stimulus to the education of the public in matters relating to general hygiene and the prevention of disease.

The health officer and the health department are no longer considered, the former a tyrant and the latter a nuisance, which have to be borne, and whose aid should be resorted to only during times of great distress through epidemics of contagious diseases, and upon whom the public can then promptly unload its responsibility. Today, throughout the country, the people are realizing that there are two kinds of physicians; the one who deals with the public at large and whose sole aim is, of course, the longevity of man and his protection from all preventable ills, and the other, who might be regarded as a repair man, who undertakes and cares for those in whom the machinery of human life is broken down or whose health has been invaded by disease, and whose sole duty is the restoration of such persons to health.

Until recently it has not been realized that the ultimate end of all municipal activities is, after all, the health and comfort of its citizens. For instance we are spending money for cleaning our streets. We do not do this alone for the gratification of our sense of cleanliness, but from a knowledge of the need of such cleaning in order to preserve the health of the community. The water department of our cities not alone supplies the citizens with water but also aims to protect life by giving a pure product. It may be said that our sewers and sewage disposal systems are for our convenience and comfort alone, but they are also absolutely necessary for the protection of health. All the departments and bureaus of the city government, except the financial, are involved more or less in the new ideas of the prevention of disease, and the health officer and the health department, whose sole duty is the protection of the health of the community, must be considered in bringing these different functions of the various departments into harmony with it.

The great danger of the present time is that the health officer is failing to appreciate the needs of the community in which he lives. In times gone by, and perhaps to some extent now among the brighter and more intelligent medical men, it was held to be somewhat *infra dig* to occupy a position as health officer or to be in any way connected with the health department. This consideration, too, is passing away by reason of the trend of public opinion and these positions are looming up in the respect of both the profession and the people.

One great factor that must be recognized in meeting the demand of the public for proper health work is the smallness of the compensation and the uncertain tenure of office for those who devote their energies to the duties of these positions. The health department is often woefully undermanned and under-equipped, but the public now recognizes the enormous economic waste arising from the loss of human life through preventable disease, and are now less liable to cavil at the compensation of the health officer or the expense of properly equipping the department.

The health officer should be a man of infinite tact, of decision of character, and with aggressive force and executive ability. He should lead public sentiment and not be a servile follower of it. He should be ever ready to seize every opportunity to address the various men's clubs of his city or town, and any other societies or associations on questions of public health. His addresses should be practical in character, and may often be made instructive by illustrating his remarks with various articles and methods in use in his department. He should direct attention to conditions that bring about and entail disease by reason of negligence of hygienic precautions. If, for instance, an epidemic of diphtheria should occur he should make popular the knowledge of the method of its diagnosis, its treatment and its prevention. It will occur to any one familiar with the work of the health department that there are many times when the department may give instructions to the people on methods of preventing disease, and on all the various ways by which disease is spread. For example, instruction in the care of milk and foodstuffs, or methods for the prevention of smallpox, yellow fever, typhoid fever, etc., can be presented and made most interesting to the public by means of public prints, moving pictures, or by addresses.

This is but the dawn of preventive medicine, and we feel sure as the day advances that nearly fifty per cent. of all the ills which now afflict mankind will be placed in the column of preventable diseases.

Legislative enactment is needed in all our states to procure for the health officer a compensation commensurate to the value of his services to

the community. This could be done comparatively easily in cities, but some method should be devised to correct the totally inadequate salaries and oftentimes ridiculously low fees now given in the small towns, villages and rural districts. In some states a county health officer is given control of the public health of the rural districts of the county, and a more adequate salary is thus paid.

Much has been said recently as to different means of enhancing the value of a health officer by reason of better instruction along sanitary lines. The fact that a medical man has taken a special course in sanitary science by no means is to be taken as a measure of his value as a health officer. So many factors, as indicated above, are of importance to his success that it cannot be held that a course in sanitary science would in any way take the place of experience in the work itself. The daily problems that present themselves to a health official extend the course of his reading and study and will unquestionably produce the best results.

The tenure of the office of a health officer is generally very precarious. While in some cities an enlightened public sentiment prevents his removal for political or any other reasons aside from his usefulness, in most cities this is not true, and if he gives to the public all his time, which under modern conditions they should rightfully expect, he finds himself often forced by shifting political conditions to begin anew the practice of his profession as a medical man or to seek some other means of support in order to secure a livelihood for himself and his family, no matter how valuable has been his service. In many of the modern charters of cities, the chief of police and the chief of the fire department are appointed for life and their removal can only be secured on the ground of inefficient service. The proposal to treat the health officer in the same way was made when the uniform charters of cities of the second class in the State of New York were being prepared, but when the bill came to be acted upon, for some reason the office of health officer was removed from the list.

A suggestion has been made that the health officer should be treated the same way the members of another profession are treated in the State of New York, namely, Justices of the Supreme Court, whose long term of office of fourteen years has brought to the bench of New York State the high reputation which, it is generally conceded, it has attained. We believe, however, that health officers should be placed in the category of permanent positions and their removal be made subject only to proven charges of inefficiency.

In closing this short article we cannot refrain from calling attention to the fact that the importance of the public health questions in the mind of the people can be no better shown than by the gathering of forty-two out of

forty-six mayors of cities of New York State in the city of Schenectady, in 1910, for the "sole purpose of devoting the two days of the conference entirely to the question of public health." At this conference resolutions were passed recommending the legislative enactment of laws designed to promote public health in the State of New York, the first of which was "the protecting of Health Officers from removal except for cause," the others relating to municipal housing law, medical school inspection, the State Health Department and a National Health Bureau.

Charles C. Duryee, M. D.,
Mayor of the City of Schenectady, and formerly Health Officer.

THE ADVANCE OF PUBLIC HYGIENE IN CUBA.

THE second meeting of the American Public Health Association in the country of its youngest cadet has come and gone, and memories of a land of sunshine and balmy breezes alone are left. To the members of the Association who were fortunate enough to attend the 39th annual meeting, which was held in Havana, came the opportunity to realize what the problems are which have engaged the attention of our fellow sanitarians in the tropics, and also the manner in which they have been dealt with. That the Cuban war of independence was most destructive of life and property was inevitable; that it was the open door for the gospel of science to enter the Cuban land was a providence. To recall what the first American occupation, ten years ago, meant, is to appreciate what pure science, under a wisely directed executive, may accomplish in any field; but to realize what it has meant for Cuba is to imagine a land whose resources had been largely undeveloped, and where a political tyranny had suppressed every aspiration for betterment and freedom, awakening as from a horrid nightmare to find the genial sunshine transfusing the gloom, where only clouds, black and fateful, had hitherto hidden the heavens from sight.

It might have been the same under any commander, but Cuba had the thrice good fortune to have as governor after the war, Gen. Leonard Wood, an army officer and physician and who possessed a marvelous executive ability associated with an acute scientific sense. General Wood was equally fortunate in the staff of medical officers selected to carry out his program and to coöperate in the work of sanitary reconstruction. The country around Havana had been absolutely laid waste by the Spaniards, who collected thousands of the helpless insurrectos into camps, where many died from starvation and sanitary neglect. General Gorgas, in replying to a Cuban toast, said that the medical officers went to Cuba in terror of what was in store for them as individuals, from malaria and yellow fever, and the safety of the army of occupation demanded that whatever of science could be applied to the problem of sanitation must be carried out promptly and thoroughly. What Reid and Guiteras and Gorgas did, and what others died for, is written on the scroll of fame as the reward of martyrs to science; but what it all has meant for Cuba is nothing less than a new creation.

To visit Cuba today where, under a cabinet minister, the talented Dr. M. Varro Suarez, a public health organization is moving as an army

moves, is to witness a triumph of state medicine probably unequalled elsewhere in the world. This organization, from the port inspection to the last detail of sanitation in the farthest province, is efficiently officered at every step from the veteran Dr. Juan Guiteras down to the last appointed inspector who may keep guard over a railway construction camp. Hospitals for immigrant suspects, sanatoria for the consumptives, and refuges for those helpless through disease, have all been established, while the investigations which have followed each other in the study of the diseases transmitted by mosquitoes, flies, and animals, present a spectacle which those of us from the colder northern climates must view as a wonder of ordered scientific progress. While the visit to Cuba has been of much interest and importance to such members as attended in widening their knowledge of how people may live and prosper in tropical countries, it has had also a deeper interest to the sanitarian and health official, since it afforded them an opportunity for comparison of methods and results with those in states so much more favorably located climatically that most diseases of a pestilential character do not tend to become epidemic. In the one instance, a complete homogeneous health organization exists, with experienced officers in every part of the country reporting directly to a central chief officer, who has at his command not only trained experts to investigate causes of infection, but also adequate facilities and powers to compel the prompt execution of the measures necessary to stamp out such diseases. In the other case, we often have a central board of health whose members are commonly appointed for short terms and for political reasons. Regulations adopted by such boards, even if scientific and well considered, often cannot be enforced in local municipalities, either because of local regulations of a crude character, or because some local interest is being interfered with, or because of the personal selfishness of some local political member who may think he has a grievance, and who often receives much greater attention at political headquarters than any question of health affecting the highest interests of the people as a whole. It is not of course forgotten that the strength of the Anglo Saxon characteristic of individuality lies in the fact that in the smallest village community the individual has a right to speak, and, within fair limits, to act as he decides is proper, and that nothing prepares a man better for the higher duties of citizenship than to have to meet responsibilities; but if this desirable end is to be arrived at, it is essential that it be associated with adequate knowledge and a sense of public duty What in matters of public affairs, and notably in public health is, however, demanded is an education along lines of science as well as of politics; whereas, today it is the latter only which the ordinary public man deems of any interest or importance. Such men may act with spas-

modic energy when sudden great dangers to health occur, but it requires, as the history of ten years in Cuba has shown, a highly organized health machine, so effective that the politicians dare not tamper with an organization which has a cabinet minister at its head, for fear of drawing upon themselves the wrath of a people who know that they have been saved from calamity and who, recalling what once was, demand the conservation of the means of safety which science has secured.

Until the public health service, so scientific in essence, so difficult to administer where ignorance or personal interests are involved, becomes a separate service under an expert cabinet minister with all the permanency which a permanent civil service act can give it, no state can possibly develop greatly in state medicine. The members of the American Public Health Association from the United States may well look with envy upon those organizations in Cuba, Mexico and Canada, which move on from precedent to precedent largely independent, if not unconscious, of, the intrigues and animosities of party politics, until the science of public health has or shall ere long occupy its true position, as the highest interest or duty of the statesman, since upon it depends the safety, health and happiness of every citizen.

PETER H. BRYCE.

THE RELATION OF THE NURSE TO PUBLIC HEALTH PROBLEMS.

A FORCEFUL, twentieth century campaign, having for its purpose the spread of a general knowledge concerning the laws of health, has been well started. "Health movement" precepts are found in small type all through various magazines and newspapers. In large type, the same subject confronts us from numerous posters. We hear the subject discussed in local and national meetings and from the pulpits. We are urged to clean up, physically and mentally, and to keep clean. To do this efficiently, as a whole, will need a host of honest and brainy workers; the doctor, scientist, educator, sanitary engineer, architect, physiologist, bacteriologist, chemist, statistician, sanitarian, sociologist, social worker, nurse and politician.

One of the largest of the public health problems, is the matter of housing; the various enclosures from the elements, where we live, where we work, where we play. Frequently, one shelter serves for the three uses at the same time. This is a condition in need of the services of some of the experts. The housing of people who can intelligently plan for themselves and arrange for their own conveniences is not a problem for consideration by the outsider, except in cases of illness, when the doctor and the special duty nurse serve as important factors in the education of the family and guard against such conditions as would be the cause, possibly, of the spread of contagious diseases throughout a community. In such instances, the value of the nurse is of great importance, for she lives with the problem, and a slip in the application of the rules of sanitation may mean the surrender of human lives in that family or in that community.

But the houses which have been constructed for gain, by architects who have never had the pleasure of one whole year's round of cooking, washing, cleaning, and making "home" sanitary and cheery, are the houses in which the nurse, today, is almost at a loss to know how to dispose of the various problems. She may find not only a case of illness in the home, but also shiftlessness, drunkenness, and uncleanliness together with bad air, lack of sunlight, and bad construction of the building, ignorance and superstition. Of all the groups of people who are entitled to come to the door of this home, the janitor, the food dispensers, the rent collector, the minister, the policeman, and friends, who but the doctor, the social service worker, and the visiting nurse really set their shoulders to the

wheel of misfortune and help to stem the tide? Because of her special training, inspection comes easy to the visiting nurse, and because of this and her knowledge of where to secure outside relief, she can be of more service in untangling the problems in such families than can anyone else. She not only provides nursing care for the patient, but secures the services of a physician, and is able, if it is thought best, to arrange for the care of that person in some proper institution.

Her position as a visiting nurse requires her to report cases of contagious and infectious diseases to the proper authorities; cases of abuse to the police, and cases of need to such societies as stand for the extension of immediate relief. Her work should be of the preventive as well as of the corrective type. She instructs and re-instructs, and follows up her cases; here is required not only knowledge, but judgment and a display of individual virtues.

The visiting nurse movement started in the United States in 1877 with one association. The year 1895 showed a growth into the teens. In 1908, one hundred and twelve associations were reported. New York State leads with the employment of four hundred and fifty-eight visiting nurses; then follows Massachusetts, Pennsylvania and Illinois, in the one hundred division line. All other states employ less than one hundred each.

The tuberculosis problem presented itself to the nurse partly in her visiting work and partly in her dispensary work. The tuberculous patient showed up at a general "chest clinic;" good advice and a tonic were given and the patient sent home; he was either "lost" to the medical man who diagnosed his case or returned, in due course of time, in a much worse condition. Possibly some member of his family came into the clinic, and the medical man learned through him the fate of his former patient. Nurses were introduced into the dispensaries to help in the taking of histories. Later they went into the homes to find out why the good advice was wasted. Then they found the insanitary home, the factory work brought into the home, and the sweat shop. A special campaign followed the unearthing of these conditions; literature was spread as to the care of tuberculous patients, and owing to a continued demand by the doctors and nurses for some place to put these patients, various sanatoria and open-air schools resulted.

Cleveland, in July, 1904, appointed Miss Elizabeth Upjohn as its first specialist in nursing the tuberculous poor. Miss LaMott was appointed in Baltimore, the same year, in the same kind of work. Following these examples, there are cities in seventeen States which employ nurses for tuberculous patients.

Subsequent to the medical inspection of the public schools, the follow-up work of the nurse developed. Here, again, is the keynote of the health campaign sounded—prevention. Here the daily contact of the nurse with the pupils brings before the medical man various cases of ring-worm, scabies, impetigo, and defects of the eye, ear, nose, throat and teeth in addition to the contagious diseases. The nurse not only assists the medical inspector, but in her follow-up work, calls at the homes to inform the parents of the nature of the child's defects, to call attention to the importance of having such defects relieved, and to give warning of what will happen if such relief is not given. In some instances lectures which include domestic science and the first principles of nursing are arranged for mothers' meetings.

Today we find twenty-four cities in fourteen states which employ public school nurses, either under the Department of Health or the Department of Education.

Believing that it is better economy and more humanitarian to keep an infant well, than to allow it to get sick and then try to bring it back to its normal condition, societies have been established with the work before them of saving the babies. Local conferences are held, at which time the mothers bring the infants; the babies are stripped, weighed and then examined by the attending doctor. Instructions are given by him as to the proper food, regularity of the feedings, fresh air, cleanliness, etc. The nurse follows these babies into the homes, teaching the modification of the milk, bathing, handling, and general sanitation to the mothers. The mothers are encouraged to bring the well and best-fed babies to the conferences as well as the sick babies.

Inspections of various kinds are being put into the hands of nurses. Just how far and how useful this will become depends upon the kind of an expert the various schools for nurses are able to develop from the material presented to the schools and also upon the kind of inspections called for. Inspections of the proper kind mean much to the public. We now find one nurse as a capable tenement-house inspector. Would a nurse, as inspector, be worth while as a milk inspector, or for a pure-food, factory, almshouse or jail inspector? Would she prove that her nature and education is such that she could still see "uncleanliness" above the political brim?

The hospital is one of the public health problems which is not often considered by a community as one of its own. Because an institution is a hospital, members of a community often avoid it until such a time as it becomes a necessity to enter it. The idea, usually taken for granted, that a hospital is always the cleanest place, the best regulated and most scien-

tific, does not make it so. It meets these ideal requirements according to the amount of money it has to do with, and according to the interest of the superintendent and the medical men connected with it and the board who manage it.

The problem of how to care for the patient under most trying physical and mental circumstances, of how to raise his standard of health to normal or nearly normal, and how to keep a normal standard of health for the student nurse, who is in close touch with various infections, and who is under other adverse environments, is a serious one. The superintendent of the hospital and the superintendent of the nurses are the ones who live with these problems, and work them out for the public. In many instances, the superintendent of the hospital and the superintendent of the nurses, is the same person.

To meet another problem which confronts us in times of national calamity or war, "a National Committee on Red Cross Nursing Service has been created by the War Relief Board of the American Red Cross. This committee of fifteen members has been made responsible for the establishment of a uniform standard of qualifications to govern the enrollment of nurses, and for the organization of an adequate Red Cross Nursing personnel." This standing army of American nurses, ready for almost immediate action, numbers over two thousand and is increasing daily. When the need comes, only by comparison with like needs in the past will there be shown the value of having completed an organization of the nursing force.

The nurse in her relation to public health problems not only grapples with the alleviation of disease, but her main work is one of education and prevention. May we earnestly hope that women of health, character, knowledge, and refinement, will be encouraged to take up this work.

MARY C. WHEELER, R. N.
Secretary, Illinois State Board of Examiners of Registered Nurses.

PUBLIC HEALTH A PUBLIC SERVICE, NOT A POLITICAL FOOTBALL

PUBLIC health and politics are incompatible, and the politician who has favored any drastic public health project other than for his own selfish political ends is a *rara avis*. It is time the people realized that progressive public health work is not only hindered, but prevented by the politician. As a consequence of political interference, hundreds and thousands of innocent lives are lost to the community and the lives of all of us are jeopardized. If the people were only fully seized of the fact, they would not be long in committing this pestiferous saprophite to the common destructor, from which the ashes could be removed and utilized in inanimate form to much better advantage than could possibly be hoped for from his crooked and perverted anatomy when sitting in legislation halls.

If public health work of any kind is to be successfully and efficiently carried on, it can only be along those lines which admit of freedom from political influence. The official charged with the administration of public health laws must administer them justly; this implies freedom from political bias, and so long as he administers the work rightly he should not be interfered with for political reasons.

To one who has been in public health service for nearly a quarter of a century, it seems important to create in each country, state, or province, a public health service into which men will be admitted, not as political favorites, but by reason of their training, knowledge and fitness. When once admitted into such a service it should be made possible for them to rise by reason of length of service, and professional and executive ability.

It should be a case of "Parties may come and parties may go but public health goes on forever." Politicians may run the administration of a department of agriculture along political lines, to the detriment of cattle and incidentally to the loss of the farmer or to the expense of the people; they may sometimes waste our money enriching political friends at the expense of all, but nobody is hurt except an occasional boodler or grafter who may be incarcerated in gaol for a brief space of time, sufficient to appease a disturbed populace.

To juggle with public health is to jeopardize the lives, not only of the living, but of the unborn; it is to commit manslaughter of the worst type; it is to stultify and stifle a work which has for its object not only the prevention of sickness and suffering, and the prevention of premature death, but the physical and mental improvement of a nation.

It has unfortunately been the practice in some sections of this continent for an incoming political administration to dismiss from office, health officials who for some years have been giving to the people a service which has been of the highest character, free from political bias, and satisfactory to their sanitary confreres who are best able to judge of their work. Yet for party reasons, to gratify the demands of this or that particular faction of the party, either a system of garotting or decapitation has been resorted to—and for what and why? To get rid of a good and efficient public servant, one who for years has been making sanitation a study for the benefit of the public, irrespective of politics, and to put in his place and stead a political favorite, one who may perhaps have the degree of M. D., and yet may know little about public health work, either as it relates to communicable diseases or to the higher and more important branches of hygiene.

This procedure is unjustifiable and sooner or later it must be remedied. The suffering electorate must say to the politician "hands off the public health branch of government administration." This course must be pursued if a country is to advance in all matters relating to the health of the people. Men should not be placed in prominent health offices unless qualified, for men are not born sanitarians, nor can they be hatched out in a night at any party caucus. It takes years of patient and careful study to fit men for these important positions, and when once a young man starts on the sanitary ladder he must be assured that his course will be progressive, and dependent not on political influence but upon service and efficiency.

The important position of a medical officer of heatlh is one which today cannot be lightly passed by. The very term "public health" signifies a person infinitely more capable than an inspector of nuisances or one charged only with the oversight of communicable diseases. Year by year the conception of the duties of a medical officer of health has been altering and expanding, until today his field is a wide one. It is true his duties require he should have intimate knowledge of the older branches of the work, but these are less difficult and not so onerous as the newer and more important ones, such as, for instance, the medical inspection and care of infants and school children, and the proper education of the latter in the rules of the goddess of health, or the housing of the people—not to speak of sewage disposal, water purification and a score of other matters, all bearing upon the health of a nation, with the object of conserving its greatest wealth.

In the football game which has been going on for some years, the ball used has been the officer charged with the administration of these important subjects. Surely the ball, in all it represents, is too valuable to the public to be thus made use of by politicians, and it is high time they were given notice to stop this high kicking of so important and national a subject as our public health administration. And further, they must be told that a line-up will be sure to occur, public vs. politician, in which a fierce scrimmage will inevitably happen. The final damage will not be to the ball, but to the discredit, the discomfiture, and the defeat of the politicians.

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SPECIAL ARTICLES

A COUNTING APPARATUS FOR LITMUS PLATES WITH A COLD COUNTING PLATE FOR USE WITH GELATIN PLATES.

By S. HENRY AYERS,
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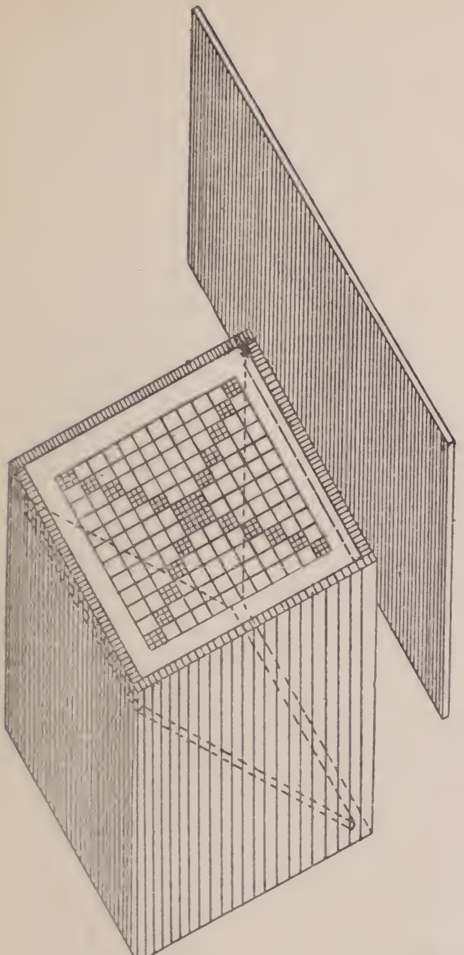
Investigators who have had occasion to use litmus in plates as an indicator for acid-producing colonies have without doubt noticed the difficulty with which slight acid-producing colonies are differentiated from the others.

During a recent investigation in the Research Laboratories of the Dairy Division, in which a large number of differential counts had to be made, the author designed a counting apparatus for the determination of acid-producing colonies on litmus plates.

The apparatus as shown in Figure I, consists of a wooden box seven inches long, seven inches wide, and six and a half inches high. The top of the box is covered by a piece of ground glass over which is placed an ordinary square counting plate. The front of the box is open so as to admit light which is reflected to the counting plate on the top by means of a plane mirror placed in the box at an angle of forty-five degrees. A shield of wood, fourteen by seven inches, is attached to the front of the box one inch below the top. This shield is to protect the eyes from the light which is used in connection with the apparatus. A laboratory electric arc lamp, such as is made by E. Leitz, is most convenient, since it furnishes a powerful white light which can be centered on the mirror. Gas lamps may be used and two lamps of the Welsbach "Junior" type placed side by side give perfect satisfaction. A small acetylene gas bicycle lamp may also be used. The ordinary incandescent electric lamp is of no value for use with this apparatus, since it gives a yellow instead of white light. A yellow light so changes the blue color of the plate that acid-producing colonies fail to show the red coloration.

When this apparatus is in use, the counting plate is illuminated by a bright white light, and on account of the ground glass no images are reflected from the mirror. The acid-producing colonies on the litmus plate, as it rests on the illuminated counting plate, show very distinctly in contrast to the dense blue.



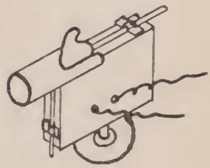


Fig. I.

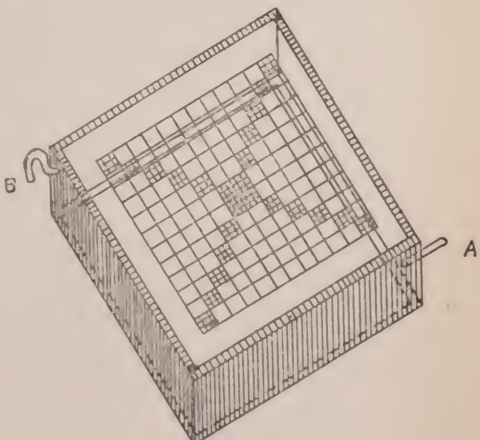


Fig. II.

It has been found that colonies which do not show any red coloration when placed against the ordinary white counting plate, or when held against the sky, do show a distinct acid reaction when placed on this counting apparatus. When differential counts are made, using litmus as an indicator, it has been found that when using the illuminated counting plate the acid-producing colonies are increased from twenty-five to fifty per cent.

With the use of litmus lactose gelatin plates for differential counts the temperature of the room plays an important part. In the summer time the temperature of the air will often melt gelatin plates even before they can be counted, thus making it impossible to pick cultures from the plate. In some recent work it was found necessary to pick all the colonies from a large number of litmus lactose gelatin plates. This involved from one to two hours work on a gelatin plate with the room temperature 29.4°C–37.7°C. (85 degs. to 100 degs.F.) This temperature melted the plates in a few minutes and in consequence a transparent cold plate was devised. Figure II shows a view of this cold plate which is a copper frame supporting a glass counting plate (on the other side.) The apparatus is therefore a copper box seven inches square and one and a half inches high with a glass top and bottom. The glass plates are supported on shelves which extend one-fourth of an inch from the copper walls and are cemented to them to make the box water tight. On one side at the bottom is a small inlet pipe A, and at B an outlet pipe at the top. The outlet pipe B is curved above the surface of the plate. When in use this cold plate rests on the top of the counting apparatus previously described and sets directly on the ground glass. A stream of cold water is then allowed to fill the chamber by entering at A and flowing out at B. On account of the curve in the outlet pipe the chamber may be kept filled with water without containing air bubbles. This arrangement gives a counting plate which is kept cold by the water and at the same time is illuminated by light reflected by the mirror up through the transparent layer of water. If the ordinary tap water is too warm the stream may be run through a coil submerged in brine.

With this cold plate it was possible to work on a gelatin plate for several hours when it was resting on the cold surface. By passing the tap water through a coil in brine it was possible to get a temperature of five degrees C. (41 degs.F) with the thermometer resting on the surface of the cold plate. The temperature of the room at that time averaged about 32.2 degrees C. (90 degs. F.)

The apparatus is simple and inexpensive to construct and will be found extremely useful.

THE HAVANA MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

By GARDNER T. SWARTS, M. D.,
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Notwithstanding the distance, and the necessity of travel by sea in order to reach the place of meeting, a remarkably good attendance was in evidence. The members from Canada, Mexico, from the Pacific Coast, and from the eastern states found their way by devious routes to the Island of Cuba. About one hundred and twenty-five members were in attendance accompanied by an unusually large number of ladies. Over one hundred and fifty new members were added to the Association.

A varied program, covering a broad field of sanitary questions, was presented. On account of the location of the meeting, many papers of interest to those responsible for a strict quarantine were considered. Owing to the prevalence of Asiatic cholera in foreign ports, a symposium on the detail of the examination of excreta from emigrants for the detection of cholera carriers as employed in the quarantine services of Canada, the United States, and Cuba was listened to with close attention. The report of Committee on Education of the Public as to the Communicability and Prevention of Gonorrhoea and Syphilis was given close attention.

The papers on typhus fever and the extension of the work to eradicate hookworm disease indicated a continued interest in those subjects. Reports on the prevalence of and the investigations of conditions associated with infantile paralysis as well as on the progress in the study of pellagra showed that these fields were still open for further investigations by health authorities.

A paper on Sludge Disposal by Rudolph Hering presented one of the engineering problems associated with sanitation. The article on "The Relation of Infant Mortality to the Cost of Living" indicated the close relation of sociological and public health problems. The consideration of "Nomenclature of Deaths and Disease" received its annual apportionment of time. Of the many other papers and reports presented the one submitted by Dr. Chas. V. Chapin, under the title of "Air Infection" received marked approval because of the simplicity of methods presented for preventing the transmission of communicable diseases when associated with each other under the care of the same corps of nurses in the same building or in the same open ward.

A short historical sketch by Dr. C. W. P. Brock, of Richmond, Va., on "How the Confederate Army was Vaccinated," suggested how the interference of a sanitary measure permitted the continuance of hostilities by the Confederate Army, and demonstrated the loyalty and voluntary assistance of Richmond mothers and of young children to the Southern cause.

The Sections took up for consideration the technical application of methods in their various lines. In the Laboratory Section several papers on the care of water supplies were presented. The long anticipated report of the Committees on Standard Methods of Water and Sewage Analysis, brought up to date, was made available for publication. Standard methods of bacterial diagnosis and methods for testing shell-fish were discussed, and a number of papers on testing disinfectants were read. The methods of preparation of various serums were discussed in the practical manner customary with this Section. The Section on Vital Statistics considered mainly the question of utilizing uniform tables for weekly, monthly and annual mortuary compilations in cities and in states respectively. A symposium on "Mortality Registration, as Applied in the South," and on a "Uniform Classification of Still-Births" were also presented. In the Municipal Section the every day questions of the city health officer were taken up and considered, among them "A Report on the Disposal of Municipal Wastes"—"Some Legal Aspects of a Bottled Milk Regulation" by Jordan—"Municipal Inspection of Food Supplies" Jordan. The Committee on Contageous Diseases also reported.

Entertainments: Visits were made by the individual members to the General Hospital, the Tuberculosis Sanatorium, and to the Leper Hospital where there are one hundred and eighty cases being cared for. One afternoon was devoted to an extremely interesting visit to the fortifications of Cabanas and Morro Castle, and to an inspection of the Immigrant Detention Camp, called Triscornia, with its hospital, all beautifully situated on a high elevation on the edge of the harbor. A Smoker, or as it is known in Cuba, a Verbena, which consisted mainly in the presentation of characteristic music and Spanish dances by artists in their various lines, assisted by the local military band, filled one evening with enjoyment. Of great interest to the visiting members was the practical evidence of a nearly completed sewerage system. All fully appreciated the privilege of roaming about the quaint streets, shops, public markets, parks and numerous restaurants for which the City of Havana is noted.

THE REPORT OF THE MINNEAPOLIS VICE COMMISSION.

By GEO. F. BUTLER, M. D.,
Chicago, Ill.

No one will question the good intentions of the people responsible for this report, nor their standing as citizens, but, as seems to be common to investigations of this sort at the present time, we find them misled into conclusions which are utterly wrong.

The book has all the ear-marks of authority; it is endorsed by the mayor of the city which it represents; the collaborators are people of rank in their respective vocations; the context has a semi-scientific look. On the strength of all this, the average reader, ignorant as he is on sex matters, will probably accept it as gospel truth, and regard it as the very last word on the subject. Any thinking man, however, who has had opportunity to observe life as it really is, and who has taken the pains to study prostitution and the sex desire, will readily see how fallacious the conclusions and recommendations of the Commission are.

The group of people who prepared this report may know a good deal about their several vocations, but they have yet a lot to learn about the topic on which they ventured to write. Not only do they lack anything but a very superficial knowledge, but it is reasonable to assume that they are led astray by the prudery that abounds so generally, and also by a weakness in the direction of adhering to orthodoxy.

As might be expected, the Commission recommends the policy of suppression, wholly and unconditional. If these same people are alive one hundred years from now, it is certain they will then see how ridiculous is such a recommendation. A century hence they will be ashamed of it.

The sex desire, next to the desire to live, is the most powerful in the human make-up. It transcends all man-made laws; it bows to no authority. In most people it cannot be, and is not, eliminated; it persists in the properly-developed and healthy adult from puberty to old age, when it is finally extinguished. It follows from the above, and from the fact that economic conditions exclude an increasing number of males from wedlock, that the prostitute is with us, and always will be with us, at least as long as the present civilization lasts. The prostitute is here because there is a demand for her. Conversely, if there were no demand she would not be here. Hers is the infamous task of supplying a want that rightfully ought to be supplied in wedlock.

It is doubtful if prostitution can ever be abolished, but it can be regulated in such a way as to greatly diminish the evils that are associated with it, and the only right and practical course, as we shall come to see sooner or later, is the strict segregation of all prostitutes and a careful regulation of their goings and comings.

The day will come, perhaps, when the prostitute will be unknown and unneeded, but only after the ecomonic conditions under which the masses live have been bettered; so long as the pinch of poverty is felt, and other defects in our present civilization persist, so long will the "social-evil" persist.

The Commission very properly recommends that hospital facilities be furnished for the treatment of venereal diseases and that the law be broadened so that the State Board of Medical Examiners be given sufficient powers and funds to adequately control the quacks specializing in venereal diseases. The Commission also very wisely suggests that preventive measures are to be found along (a) educational lines, (b) in larger recreation facilities, (c) in better economic conditions, and (d) in certain provisions for institutional care.

Its advice regarding rescue and reform is good. The motive of the Commission throughout is good and worthy, but, in the opinion of the writer, utopian as far as the absolute prohibition of prostitution is concerned. Every decent man and woman wishes it could be abolished, but, as it seems to be impossible at the present time, why refuse to attempt to regulate and thus minimize the traffic and its consequent evils?

METHOD EMPLOYED AT NEW YORK QUARANTINE FOR THE DETECTION OF CHOLERA CARRIERS.

P. A. Surgeon R. H. CREEL,
U. S. Public Health and Marine-Hospital Service, Ellis Island, N. Y.

In July, 1911, the cholera epidemic in Italy reached such proportions, and so many cases of cholera developed among Italian immigrants en route to the United States and among those detained after arrival in quarantine at New York and other ports on the Atlantic seaboard, that quarantine regulations of the Federal Government relating to cholera were amended so that all steerage passengers coming from cholera infected ports to this country should be held for bacteriological examination before being discharged from quarantine. The new regulations were promulgated in order that cholera carriers might be detected and detained. Accordingly, all ships from cholera infected ports were held at quarantine and fecal specimens were taken from all the steerage passengers and examined for the presence of cholera vibrios.

At the New York state quarantine station, from the middle of July to the middle of November, 1911, the number of immigrants examined was 26,930, of which the New York City Laboratory examined 3,900. On some days the number of examinations did not exceed 300, but not infrequently it was twice as many, and sometimes reached 1000. On one occasion over 2,000 steerage passengers arrived at one time. Such fluctuation of work entails a strain on the laboratory staff that can not press into service a large corps of emergency workers, and in this category, of course, fall the majority of quarantine laboratories.

As the work progressed, there came a realization that the efficiency of the examination would be promoted by adopting procedures that would expedite the work, and so from time to time, with this object in view, changes in technique were made.

The object in describing the methods used at New York is rather to set forth results accomplished in hastening the work than to present anything essentially new in cholera examination, for the expeditious methods finally evolved may serve as an aid to those who may be confronted with the examination of a large number of cholera suspects, and who may have only a small laboratory force available for the work.

NOTE.—The simplification and abbreviation of methods were due to suggestions made by Dr. C. E. Baldwin, in charge of the laboratory, Dr. W. F. Magill, head of the New York state laboratories, who coöperated in the work throughout; Dr. Serrati, of the Italian Navy, Royal Commissioner at Port of New York; Dr. A. J. Bendick P. A. Surgeon McLaughlin, P. A. Surgeon von Ezdorf, and the writer from United States Public Health and Marine-Hospital Service.

The methods advocated are as follows:

Obtaining specimens: If the passengers have to be held on board ship, rectal swabs are recommended, for without doubt this method is the quickest and is the surest, because it prevents confusion of specimens and because it prevents substitution on the part of those examined. One man with a clerical assistant can take 150 swabs an hour from men, and 100 an hour from women and children. It is best to employ a female operator to take specimens from women. If the professional force is small a skilled nurse can perform this work. If the persons to be examined can be segregated in properly equipped quarters and if an adequate force of assistants is available, swabs from stools obtained by the use of salts are preferable to rectal swabs in working to detect carriers, because a larger amount of material is available for examination.

As each person passes through a room set aside for the purpose of taking swabs, a number is placed on a card bearing the passenger's name, manifest number, and the ship's name, all of which has previously been made out, and the same number is affixed to a peptone tube into which the swab is to be dropped. In taking the specimen, a cotton swab similar to an ordinary throat swab is used, after having been previously dipped into a peptone solution, which serves as a lubricant and maintains the viability of the specimen.

At first the inoculations were made in the laboratory and the swabs were conveyed to and from the ships in individual tubes, but this method was abandoned for direct inoculation of culture tubes at the time of securing the specimen, the swabs being taken to the ship in sterile packages of 100. The change resulted in very material saving of time and labor. By the skill and dexterity which come with experience, the swabs can be passed without a speculum, but individual glass specula were used to some extent. The latter consist of small glass tubes open at both ends, and with rounded edges. They can be inserted with facility and cause less discomfort than passing the swabs direct and their use permits of the removal of a greater amount of the desired specimen. With subsequent sterilization the same tubes can be utilized over again on other suspects.

As the inoculation of the stool was made direct from person to peptone tube it was necessary to take the culture tubes to the ship numbered and ready for inoculation. The tubes were carried in wooden blocks such as are used in laboratories, each block contained forty tubes set upright in holes bored to hold them. Wire test tube racks are superior to the wooden blocks but are not so easily made. It is necessary to number only the end tubes in the blocks.

Subcultures: The original cultures were incubated six hours and then inoculated into fresh peptone tubes. The time element is not so important in the incubation of subcultures; from six to ten hours was the usual period employed by us.

In the latter part of work subcultures were made in a special saccharose peptone medium devised by Dr. Arthur Bendick.* This medium seems to promise the elimination of smears from such cultures as do not contain cholera or cholera-like vibrios.

In making subcultures two radical departures were made from the technique generally used. (a) Cotton plugs were discarded. This is open to two possible objections; first, difficulties may arise from aerial contamination; second, danger may result to the laboratory force through scattering of the infection. As to the first, it is a negligible factor. In several thousand tubes so treated no confusing growth resulted, partly, no doubt, because the peptone solution is a poor medium for many bacteria. The tubes, when prepared, were placed in blocks and each series covered by sterile muslin cloth securely fastened in place. As to dissemination of infection, the only precaution necessary is the complete elimination from the laboratory of flies and other insects. The avoidance of handling plugs saves much time. (b) The second divergence from routine technique consisted in the use of individual wire loops for the transfer of cultures. These loops were made from a light composition wire and sterilized in bundles of 100. By using these loops and by placing the rack containing the original cultures beside the corresponding rack of tubes to be subcultured one man can do three hundred subinoculations an hour. The individual loops save the time consumed in sterilizing an inoculating needle. On transferring a drop from the upper layer of the original culture to the subculture the loop is dropped into the latter. The question arose as to whether the metal, by remaining in the culture medium, exercised any restraining influence on the growth of inoculated organisms, but control experiments failed to show any such effect.

Smears: Smears from subcultures are strongly advocated. There are a number of reasons why the examination should be confined to subcultures in examinations to detect carriers; there are, too, several objections to the use of the original cultures for this purpose. First, reliance on the smears from subcultures prevents useless plating, for not infrequently a smear from an original tube shows forms that prevent the discarding of the culture as negative. These forms appear to be isolated, suspicious-looking, curved rods. They are really artifacts, due to stain, or to detritus of media, or they may be distorted bacilli or non-pathogenic vibrios that

* See page 905.

do not multiply and do not appear in the subculture. This applies only to the original cultures, for however few the cholera vibrios are in the specimen, and however scarce they appear in the smears from the original culture, the smear from the subculture always shows a large number of cholera vibrios in every field. The examination of five fields or less is sufficient when smears are made from subcultures. Secondly, subculturing facilitates isolation of cholera colonies from the plates, for if only a few vibrios are present in a specimen, and this may frequently happen in carrier cases, they may be lost on plating, either through the dilution of the culture incidental to plating, or through overgrowth by other colonies. Special plate media obviate this last possibility, but special plate media in comparison to alkaline agar require too much time and trouble for practical purposes, and plating from subcultures renders them nonessential.

Plating the original culture on agar, with failure to isolate a vibrio afterwards discovered to be present in the culture, probably has given rise to term "non-enrichment." This term as generally used apparently implies a condition of latency. That any cholera organism fresh from the intestines will not multiply greatly when transferred to an optimum medium seems wholly improbable. Neither in cases nor carriers was this observed in the series of sixty-two cases occurring at the station. It is readily understood that, among carriers, if the specimen inoculated contains only a few vibrios, the increase from these after six hours incubation may be so limited as to cause the vibrios to be overlooked in the smear. This actually occurred during last summer's work in five specific cases, two of which were reported by Dr. Krumwiede from the New York City Laboratory. In each instance, though, the smear from the subculture showed at a glance large numbers of vibrios. Also a number of cholera-like vibrios that did not appear in the examination of originals were observed in the smears from subcultures and easily isolated from the latter.

It was our custom to make smears on glass slides, putting five on each slide, and numbering the first and last smear with a grease pencil, the intermediate smears being indicated by a small cross. No trouble whatever arose from the obliteration of the grease pencil marks. The material for the smears was taken from the upper layer of the culture and, as in the method of subinoculation, individual loops were made use of for this purpose. One worker can make 150 smears an hour. Drying of the smears was hastened by passing the slide through a flame until the slide became hot, and then, after the slides had cooled, the smears were stained with dilute carbol-fuchsin—one part of carbol-fuchsin to eight parts of distilled water.

Examination of smears: In consideration of the fact that subcultures always showed the vibrios in great numbers if they were present at all, a prolonged search of the stained smear for vibrios is not necessary. One worker can examine three hundred smears in eight hours.

Plating: In making plates a drop from the upper layer of the subculture is diluted by adding it to a tube of fresh peptone solution, and one drop of the dilution is put on a plate and rubbed in with a glass rod. In subculturing, in making smears, and in plating, care should be exercised to avoid any surface pellicle. In no instance was difficulty experienced in isolating cholera or non-cholera vibrios from subcultures by the use of alkaline agar plates. A fairly large experience shows that, if subcultures are employed, the use of special plate media such as Dieudonne's or the even better alkaline egg medium devised by Dr. Charles Krumwiede*, is an unnecessary refinement of technique. All the advantages that Endo's medium possesses for isolation of *B. typhosus* obtain in cholera work if the alkalinity of this medium is increased to double that usually employed, for on this medium vibrio colonies give a very typical, clear, amethystine color.

Identification of vibrios: The final diagnosis is determined by the isolation of the vibrio in pure culture and its instantaneous agglutination with specific serum in dilution of 1–400, the controls being negative. In one instance I worked with a vibrio similar to the cholera vibrio in morphology, motility and also in cultural characteristics, which agglutinated with specific serum in a dilution of 1–400 after fifteen minutes, and did likewise with normal serum in the same dilution. As the clumping of the organism in specific serum was not observed in any higher dilution than that of normal serum the organism was excluded as a cholera vibrio. Subsequently, for experimental purposes, the same vibrio was swallowed by a laboratory worker without any ill effects.

For provisional diagnosis when a vibrio was found in a smear mixed cultures were tested in the hanging drop. If there was no cessation of motility when the cultures were treated with cholera serum in low dilution a tentative decision was made that the vibrio was not cholera. If there was clumping of the mixed culture in high dilution it was considered positive until the examination of the suspected organisms in pure culture settled the matter. Cultural tests were not relied on to confirm the identity of the cholera vibrio. The cholera-red reaction as applied to mixed cultures was dropped as useless, for many negative cultures gave various shades of red when treated with concentrated sulphuric acid. The motility of the cholera vibrio is characteristic but is not distinctive, for any polar flagellates, including non-cholera vibrios and pseudomonas, have the same rapid darting motion.

* Accepted for publication in the Journal of Infectious Diseases.

SUMMARY.

In summarizing the preceding paragraphs on methods the following salient points are epitomized:

In obtaining specimens, if it is necessary to detain the suspects aboard ship, or if the staff conducting the examination is small, the use of rectal swabs is advised, for it is a quick method and it prevents deception and substitution of specimens on the part of those undergoing examination. Furthermore, if the procedure has to be confined to ship's quarters, the administration of a saline cathartic carries with it the possibility of disseminating infection. If the passengers can be segregated on shore and a large supervisory force is available, the administration of salts with a subsequent swab from the stool is a preferable method of obtaining specimens.

To save time the use of cotton plugs in the tubes holding both the original culture and subcultures can be discarded, if the proper precautions are observed.

The use of subcultures instead of the original culture in the preparation of smears is urged.

In making subcultures, Bendick's saccharose peptone medium promises material curtailment of work in the detection of cholera vibrios. Special plate media is not necessary in working with subcultures. A two per cent. alkaline agar is entirely satisfactory for plating out vibrios. In plating from cholera cultures, Dr. Krumwiede's special plate medium seems to possess several advantages that Dieudonne's medium does not.

In making subcultures and smears, individual loops save the time consumed in flaming the platinum loop ordinarily used for this work.

Non-enrichment, in so far as it implies latency, was not evident in cultures from sixty-two carriers and cases.

EFFECTIVENESS OF BACTERIOLOGICAL EXAMINATIONS IN QUARANTINE ADMINISTRATION.

By means of bacteriological examination, twenty-seven cholera carriers were discovered in passengers arriving at and in detention at the New York Quarantine station. On one ship which had two carriers there had been no recognized cases en route.

Because of the regulations of the Federal Government pertaining to immigrants from cholera infected ports, and because it was presumably imbued with the desire to coöperate, the Italian Government started examinations for carrier cases early in the summer of 1911. As a result forty carriers were discovered in Italy among prospective immigrants.

Following the inauguration of bacteriological examinations by the Italian Government there ensued a subsidence of carriers and cases at the New York Quarantine Station. This decline was no doubt partly due to the fact that in the latter part of the summer immigrants were detained five days at the port of departure before sailing. Thus is emphasized the necessity of thorough precautions at the point where quarantine measures should be most rigorously enforced, namely at the port of departure.

Bacteriological examinations not only confer the maximum amount of protection to a non-infected country but they also work the least hardship on commerce and the traveling public. In lieu of the expensive, irksome detention for an uncertain period at quarantine, bacteriological examinations allow the release of the ship and a large majority of her passengers after a delay of only 24 to 48 hours, according to the number of passengers, and that, too, with greater safety than was attained by the old clinical standard of quarantine.

Examination of contacts can be made within 48 hours after the separation from case or carrier. Any ingested vibrios being subject to the same conditions of mechanical transmission as the rest of intestinal contents, regardless of symptoms, will probably appear in the stool within 48 hours. This assumption is supported by the results of an experiment in the laboratory; two of the bacteriologists swallowed a fresh culture of a cholera-like vibrio and recovered vibrios from a stool within thirty hours.

Note.—For certain data in this article I am greatly indebted to the courtesy of Dr. A. H. Doty, Quarantine Officer for the Port of New York, and to Deputy Quarantine Officer E. S. Rimer, and to Dr. E. C. Baldwin, in charge of the New York Quarantine Laboratory.

A SIMPLIFIED BACTERIOLOGICAL TECHNIQUE FOR DETECTING CHOLERA CARRIERS.*

ARTHUR J. BENDICK, M. D.,
New York.

The routine bacteriological examination of immigrants from cholera-infected ports, as practiced at the Quarantine Station at New York, has been as follows:

1. Inoculation of feces into Dunham's peptone solution.
2. Subinoculation at the end of six hours of one loop of the surface growth into a second Dunham's peptone tube.
3. Examination of a smear taken from the surface growth of the second Dunham's peptone tube, after it has been incubated six to nine hours at 37°C.†

This procedure has in general given very satisfactory results but it necessitates considerable microscopical work. On several occasions at New York it has been necessary to examine over two thousand immigrants a day, and even a trained force of bacteriologists required a whole day to complete the examination of so many smears, so that an untrained staff for such an examination would certainly require several days. The substitution of a macroscopic test for the microscopic examination, would greatly lessen the work.

To make such a substitution possible, I began a series of experiments on the cultural characteristics of the cholera organism. The cholera-red reaction does not give satisfactory results in mixed cultures. I demonstrated that the cholera vibrio ferments many of the sugars, especially saccharose, which is fermented rapidly without gas formation. The problem, then, was how to utilize this phenomenon. As the cholera organism is very susceptible to acids, the acid produced by fermentation of the sugar is detrimental to its growth, and as the cholera vibrio grows readily in alkaline media, the natural solution of the problem was to use an alkaline medium, for therein the acid elaborated during the growth of the vibrio would be neutralized by the alkalinity. Furthermore the alkali would inhibit many of the other intestinal organisms, some of which ferment saccharose. As Dunham's peptone solution has proven such a favorable

* From the Quarantine Laboratory of the Port of New York.

† For more detailed description of this method see the article by Dr. Creel on page 899 of this issue.

medium for the cholera vibrio the new medium was made by simply adding saccharose and sodium carbonate to the Dunham's peptone solution until the medium was alkaline, phenolphthalein being added as an indicator.

The medium consists of,

Water	1000 cc.
Peptone	10 gms.
Salt	5 gms.
Sodium Carbonate	1 gm.
Saccharose	5 gms.
Phenolphthalein Solution	5 cc.

The salt and peptone are dissolved in the water over a free flame. The medium is then titrated with sodium carbonate using phenolphthalein as an indicator and is next corrected to a neutral reaction. One gram of anhydrous sodium carbonate is dissolved in the solution which is then boiled over a free flame, after which it is filtered through a double layer of filter paper. Five grams of saccharose and five cubic centimeters of a fifty per cent. saturated alcoholic solution of phenolphthalein are next added. The medium should then be of a moderately deep red color similar to the color of 0.1 per cent. fuchsin solution. One familiar with the medium may simplify the procedure by omitting the titration and correction of the reaction. In many cities tap water may be used in making up the solution, and the carbonate may be added with the salt and peptone. If after adding the phenolphthalein the medium is not deep red enough, a 10 per cent. sodium carbonate solution should be added till the medium is brought to the desired shade. If the medium is to be used the day it is made up, one sterilization in the Arnold sterilizer for twenty minutes is sufficient; if it is to be kept for some time, the medium must be sterilized in the Arnold for fifteen minutes on three consecutive days.

In this medium, if a moderate number of cholera vibrios are introduced together with other organisms, the culture becomes decolorized after five to eight hours incubation. The cholera vibrios ferment the saccharose, the acid produced unites with the sodium carbonate and the medium becomes neutral, hence the red color of the phenolphthalein disappears. As a minimal number of cholera organisms introduced with a maximal number of other organisms do not readily decolorize the culture, the cholera vibrios should be enriched by preliminary incubation in Dunham's peptone solution.

The technique in using this medium is as follows:

1. A small quantity of feces is inoculated into Dunham's peptone solution and incubated six hours at 37°C.

2. The tube containing the incubated culture is carefully tilted and one loop of the surface growth therein is inoculated into saccharose peptone.

3. The saccharose peptone is incubated at 37°C. A control is made by inoculating tubes of saccharose peptone with one loop of a fresh culture of cholera in Dunham's peptone solution and one loop of a fecal culture in Dunham's peptone solution and placing one of these tubes in each incubator. At the end of five hours all the tubes are examined, and any that have become decolorized, or nearly so, are removed for additional examination. They are re-examined at the end of every hour until the tubes have been incubated eight hours. By that time the controls should be completely decolorized. Those tubes that are not decolorized within eight hours may be discarded safely, provided the controls are decolorized completely. The only important factor is the time within which the tubes are decolorized. After fifteen hours incubation at 37°C. over 90 per cent. of the tubes become decolorized, but those tubes containing vibrios are decolorized within five to eight hours. Decolorization of the upper layer of the peptone is strongly indicative of the presence of vibrios.

Examination of the decolorized tubes. These should be examined as soon as they become decolorized and before the medium becomes acid. A smear is made from the surface growth and is stained with dilute carbolfuchsin. It is then examined and if any vibrios are seen, a third subinoculation from the surface growth is made into Dunham's peptone solution; the specimen is also plated immediately on plain agar or on one of the special cholera media. If the period for the examination is limited, time can be saved by inoculating a duplicate set of Dunham's peptone tubes at the same time that the saccharose peptone tubes are inoculated. Those tubes that become decolorized are then examined in the duplicate Dunham's peptone solution and subcultures and hanging drop agglutinations may be made therefrom.

The chief advantage of the procedure here outlined is that it greatly reduces the number of smears to be examined. By examining smears from the subcultures one trained bacteriologist can examine only two to three hundred specimens a day, but with the aid of the saccharose peptone medium, he can examine two to three thousand specimens a day even if he has only untrained assistants to make the inoculations and subinoculations. The chief use of this medium is therefore in the examination of a large number of suspects and in emergencies where no trained force is available. The procedure is of little use where only a few specimens are to be examined.

The only disadvantages which I have encountered in this procedure are (1) that the smears made from the surface growth are not as satisfactory as are those made from Dunham's peptone solution, and (2) that the specimen is poorer for the examination of motility and of hanging-

drop agglutinations. The disadvantages may be overcome by making duplicate subcultures in Dunham's peptone solution. The difficulties probably arise from the presence of a fermentable sugar in the medium, for oxygen is obtainable from the saccharose, and consequently the aerobic condition of the upper strata of the fluid is not so essential to the vibrios as it is in the Dunham's peptone solution, and therefore they show less tendency to collect at the surface.

At the Quarantine Station at New York I tested this method on 3730 suspects. In the saccharose peptone medium 106 cultures were decolorized within eight hours. Four non-cholera vibrios were isolated. The method was controled by examining smears from all the specimens. Vibrios were found in the decolorized tubes only. I was handicapped by the absence of cholera cases and carriers, none having been present at New York Quarantine for several months. However, each group of specimens was controlled by an artificial cholera inoculated stool.

Experimental data:

1. In order to show how favorable the medium is for the cholera vibrio, equal quantities of a twelve hour cholera culture were inoculated into Dunham's peptone solution and into saccharose peptone. At the end of six hours one cubic centimeter of each was plated and the colonies counted. The saccharose peptone showed more colonies per cubic centimeter than did the Dunham's peptone solution, but the surface growth as shown by smears was more abundant in the latter.

2. Accuracy of the method:—Varying dilutions of cholera cultures were made by the addition of fecal cultures in Dunham's peptone solution. In no case where the mixture was previously enriched by first incubating in Dunham's peptone solution did the organisms fail to decolorize the medium within eight hours.

Note.—I wish to acknowledge my indebtedness to Dr. A. H. Doty, Health Officer of the Port of New York, to Dr. E. C. Baldwin, Director of the New York Quarantine laboratory, to the members of his staff, and to Dr. R. H. Creel, of the U. S. Public Health and Marine-Hospital Service.

American Public Health Association

MODERN PRACTICE IN THE DISPOSAL OF REFUSE.*

By RUDOLPH HERING, Dr. Sc. C. E.

Twenty-three years ago, at a time when there was much discussion as to the proper methods of disposing of kitchen waste, and when private interests were urging all sorts of opposing ways and means to get rid of the troublesome nuisance and sanitary danger resulting from the accumulation of the solid waste materials rejected from closely-populated territory, a committee was appointed by the American Public Health Association to report on the subject of garbage disposal. It is true that in a small part of Europe some progress in relieving the trouble had been made, but even there the problem was not satisfactorily solved. In 1894, in the absence of sufficient information from which the committee could draw safe conclusions, it was decided, before proceeding further, to collect whatever fundamental data could be secured in the way of statistics and experiences in the United States and abroad. As no funds were available for the purpose, a number of years elapsed before the completion of this work. Finally sufficient evidence became available to justify some general conclusions which were reported in the years 1896 and 1897. A re-statement of these conclusions and the last report of the committee was made in 1903. The substance of these conclusions was that for different local conditions different methods were available, each one of which could be made to fulfill the sanitary requirements, and that the preference should be given to the one least costly for the specific locality. It was thereby intimated that preliminary investigations of the conditions prevailing in each locality were required, in order to determine which of the available methods of disposal would be most suitable and would give the best results in protecting health and in securing comfort and decency at the least annual cost.

The city of Milwaukee during the last thirty-three years, with a change of method about fifteen times within that period, tried almost every possible method of coping with the problem. When Dr. G. A. Bading, a member of the American Public Health Association, was

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appointed Commissioner of Health of that city, he found that the incineration of garbage in summer, and its burial in winter, was practiced, and that the ashes, rubbish, and manure were dumped on vacant ground at all times. Incineration was rather costly, although free from nuisance; burial in winter was not wholly satisfactory, and promiscuous dumping of ashes and rubbish about the city was becoming more and more a nuisance. In his efforts to correct and better these conditions, Dr. Bading availed himself of the work done by the committee of your Association to which I referred, and ordered a study made of the local situation with a view of ascertaining the least expensive method of a sanitary disposal of the entire solid refuse.

The study showed that incineration of all refuse in a modern furnace to be located near the mouth of Milwaukee River was the most economical solution of the problem, and a recommendation to that effect was made. The largest incinerator in the country is now destroying the refuse of this city and converting it at a minimum temperature of at least 1250° F. into ashes or clinker which at present is utilized for making land at the lake shore, and into steam which is available for power purposes.

Modern practice in garbage disposal is, however, not confined to this process. It is the purpose of this paper to touch briefly upon all of the best methods. To appreciate the conclusions reached, we must first realize the make-up of a city's solid refuse, because upon its composition the most suitable kind of disposal largely depends. The matter that chiefly makes up the refuse consists of garbage, the carcasses of small animals, ashes, general rubbish, manure, and street sweepings.

Garbage is here understood to mean chiefly kitchen and market garbage, or waste food material, containing animal and vegetable matter, most of which when fresh is useful as food for animals. Its very nature has therefore suggested its utilization, since it is found to possess greater money value for this than for any other purpose. Utilization of garbage in this way is very common.

Whatever limit is placed upon such a disposition of garbage must be controlled by the sanitary effects thereof. As a rule, when fresh from the kitchen, its sanitary condition is good, but it does not take many hours to change, for it serves as a medium for the growth of the bacteria of putrefaction, which give rise to offensive odors, and it affords a breeding place for flies, and flies are disease distributors.

The feeding to hogs of fresh and wholesome garbage collected from hotels, eating houses, and private residences, will always remain a legitimate and, within certain limits of distance, also an economical disposal.

In small and semi-country towns it is the prevailing method, but wherever local conditions make the safety of such a disposal questionable, other means must be adopted.

There are two further constituents of garbage which have value. One of these is its grease, roughly estimated from two per cent. to four per cent. of its weight, and the other is its carbon content of about four per cent. and some volatile matter, which both have a fuel value. Therefore, two other methods of disposal are indicated—extraction of the grease and incineration. Of these we have many examples, as most of our large cities are now using either one or the other.

The grease extraction method is commonly known as the reduction process, and is used in most of the largest American cities, particularly in the east. It is not employed in Europe, because there the quantity of grease is not sufficient to make its extraction economical. The extraction is usually accomplished by a process of boiling under high pressure, termed digestion, which separates the grease from the water and from the solid matter. The grease is refined and utilized, the water is wasted, and the solid matter, called tankage, has a small value either as a filler for strong fertilizers or as fuel.

The works where this process is conducted can be kept fairly inoffensive, if sufficient money is expended for the purpose, but experience has indicated that these plants, particularly where private profit is at stake, are frequently productive of offensive odors. It is a proper and usual precaution to place them at some distance from inhabited territory. They must, therefore, be debited with the increased cost of a longer haul than that required for incineration, which can be effected without offense much more easily than can reduction. In London, for instance, incinerators are placed at numerous points within the populated area. Attention should be called also to the fact that the process of reduction refers only to kitchen garbage, and that all other classes of municipal refuse remain, and must have other ways and places of disposal.

The remaining method of disposing of garbage is by incineration. This yields satisfactory results from a sanitary standpoint, only when the heat developed is sufficiently high to convert all the organic matter into inodorous gases and into ashes, which conversion, experience has shown, can be practically accomplished at a temperature of at least 1200° F.

The composition of garbage is such that usually the quantity of absorbed water is sufficient to prevent self-incineration by the carbon the garbage contains. Therefore we can effect garbage incineration at high temperature only when fuel is added to it. This was done in Milwaukee until the spring of 1910, and is now being done in a large number of our medium-

sized and smaller cities. If sufficient fuel is added the combustion can be made perfect, and the garbage destroyed without offense and converted into inodorous gases, ashes, and clinker. Whatever sanitary objection has been made to this process has resulted from preventable causes, the chief of which was insufficient temperature, due to carelessness of operation, or to the use of an insufficient amount of fuel—coal, oil, or gas. The fuel can be the combustible matter contained in the other classes of the city's refuse; therefore, by combining them the necessary carbon is supplied and a complete incinerable mixture obtained. This process is now utilized in Milwaukee.

Small dead animals are usually treated with the garbage. The reduction process extracts the grease from them, whereas the incineration process converts them into heat and ashes.

Where it is not practicable to adopt any of the foregoing methods, where feeding is not safe, and where reduction and incineration are too expensive, there is still another more or less satisfactory mode of disposal of garbage. This is by burial in shallow trenches, a method practiced in many places. From a sanitary standpoint burial is not objectionable, because it prevents pathogenic germs from spreading and facilitates decomposition without odor. Depending on the character of the soil, the offensive organic material disappears within three or four years if the burial is not too deep. A good earth cover of about 12 inches usually allows maximum speed of decomposition without the escape of foul-smelling gases. The city of Berlin disposes of most of its garbage by this method, but the large land area and the labor required is causing a search for other means. Other methods than those mentioned of disposing of garbage are either exceptional or unsanitary.

It may be of interest to know that about twenty-seven years ago Milwaukee was one of the first cities in the country to install a garbage crematory, and about twenty-five years ago, one of the first to try the reduction method.

Ashes constitute another class of municipal refuse. They contain a large quantity of fine dust, which, if given a chance to blow about, becomes a nuisance. On the other hand,—a fact not commonly recognized,—they contain a large amount of partially burnt coal. Various measurements have shown this amount to vary between fifteen per cent. and thirty per cent. of the discarded material; their heat value is therefore well worth attention. Ashes also have a value for filling, grading, and similar purposes. Chiefly on account of the dust nuisance they create when so used this value is reduced; but ashes, when free from dust, are more valuable than common earth filling. Furnace clinker is available, however, not only

for land making, but also as a satisfactory aggregate for concrete in its many uses for road foundations and for other purposes, and is often so used in England and Germany. Therefore ashes have several uses by which both sanitary and economical demands may be satisfied. The best modern practice is to dump them on low land, or to use them for road foundations under certain precautions, or to incinerate them further and convert them into clinker, which is done when they are combined with other classes of refuse, such as garbage and rubbish.

General Rubbish is that class of municipal refuse which embodies all of the miscellaneous materials not included in the other classes. It consists chiefly of discarded paper, wood, rags, old bedding, packing, sweepings, leaves, and similar waste. This material is likely to contain more pathogenic organisms than any of the other classes of refuse. Bedding, sweepings, and other discarded matter from sick-rooms frequently reach the municipal rubbish pile. Rubbish contains various articles that have some value, such as paper, rags, bottles, metal, and the like. In many cities it is permitted, and in some it is officially practiced, to pick out these valuable materials for sale. Although "rag picking" has extended into modern times, it is a question whether the custom should be much longer approved by public hygienists. Notwithstanding that disease is very rarely communicated by this means, and that the money profit has in some cases been large, the practice is nevertheless decreasing, and it is to be hoped that it may some day cease altogether.

The only satisfactory manner of disposing of a city's discarded rubbish, whether picked over or not, is by burning it. Its combustibility is good, but unless burnt in large quantities or mixed with other combustible refuse, it is difficult to maintain a temperature constant enough and sufficiently high to insure complete combustion with absence of odor. Rubbish is often burnt in the open at a dump, but this practice is very offensive. Frequently rubbish is used to help make land, but irregular and large shrinkage results, so that it is objectionable for these reasons and irrespective of the dust nuisance which it occasions.

When rubbish is unmixed with other refuse it is best burnt in suitable furnaces. In order to reduce the likelihood of insufficient combustion, fires should be started with materials such as picked wood, straw, and paper, which will produce no offensive odors. The rest of the material should not be added to the fire until after a high temperature has been obtained, and the fires should be drawn immediately when the required heat is no longer maintained. When rubbish is combined with the other classes of refuse, its destruction by fire in suitable furnaces has no difficulties.

Stable Manure. When this class of refuse cannot be economically applied for agricultural purposes, it is usually wasted by dumping. This practice may not be objectionable, because it may neither propagate disease nor create nuisance. However, where the wasted manure can be destroyed by burning at no great cost, this method of disposal should always be preferred because of the better results attending its immediate and permanent destruction.

Street Sweepings also form a class of municipal refuse and should receive a passing word. Their composition and suitable disposal depends much upon the kind of paving from which they are obtained and upon the nature of the road travel. They sometimes contain large quantities of manure, most of the city's dust, and sometimes have a high bacterial content. It becomes a question, which should be decided for each locality after careful investigation, as to whether the least expensive method of disposal, generally that of dumping, is sufficiently safe from a sanitary view-point, or whether the additional expense of passing such sweepings through an incinerator should be incurred. In some cities, chiefly in Europe, the street sweepings have sufficient manurial value to pay for their utilization as fertilizer.

This brief review has indicated that under modern conditions we cannot single out any class or any part of the municipal refuse and discuss its proper disposal, without including also the disposition of the other parts, because, as in the case of garbage, its combination with other classes of refuse may be the most economical and only proper method of treatment.

This review has also indicated that our best modern practice can be divided chiefly into two systems. One system embodies the separation of some or all the different classes of refuse and necessitates different collections and disposals, so that, for instance, the garbage alone, can be either burned with the addition of fuel or can be utilized by extracting its grease. The ashes are utilized for filling up land, and the rubbish may be burned separately or with the garbage. New York, Chicago, and many other cities successfully use this system. Columbus, Ohio, has the most recent installation of this type of disposal. The other system embodies the combined or mixed collection of all or almost all kinds of refuse and the incineration of the mixture in modern furnaces, with the object of destroying both the objectionable qualities by heat and of utilizing the produced heat and clinker, the former for power and the latter either for filling land, for road making or for the manufacture of sundry products. Unless ashes and rubbish are combined with garbage in sufficient quantities to produce the necessary heat, the steam production is deficient, and other fuel must be added. As the steam which is produced

in a refuse incinerator must vary in quantity with the varying composition of the refuse, the most efficient utilization will be to convert the available steam and apply the power at some larger plant where the deficiencies, when they occur, can be readily made up by auxiliary boilers with the usual means of firing. The English cities afford prominent examples of the application of this system and their procedure is being followed by German and French cities, and recently by some American cities.

The Borough of Richmond, New York City, and Seattle, Washington, both have mixed collection and modern incinerators. The city of Milwaukee has lately erected an incinerator to burn mixed refuse, but garbage is still separately collected. San Francisco has adopted the mixed system and is about to advertise for modern incinerators. The cities of Westmount, Montreal, and Vancouver, Canada, have also mixed collections and are successfully operating modern incinerators with power production.

A sufficiently close investigation of the local conditions of each city will indicate in each case which of the two equally sanitary systems of disposal is the more economical.

In comparing cost, we must include operation as well as construction, and we must not fail to begin at the point of original collection and end at the point of final disposal. A long haul and costly collection may outweigh a cheaper disposal, and short hauls may compensate for a more expensive final treatment. Also, in comparing the costs of the two systems, we must not fail to estimate the cost of disposing of all of the refuse materials. The cost for the system of garbage reduction must include the cost of a modern and satisfactory method for disposing of ashes and rubbish, and of the manure and street sweepings, too, if the system of incineration with which the comparison is made includes them.

Proceeding upon this basis and adopting all precautions to prevent nuisances both in the collection and in the disposal, we can then decide whether it is cheaper to adopt the method of reduction or that of incineration of the garbage. If we make a comparison on that basis, it is questionable whether all of our cities have selected and are now operating the more economical system for their local conditions.

Regarding precautionary measures, a few points should be added. The modern tendency is to make the collections during the latter part of the night, at which time they are least objectionable. In any case, the wagons should be tightly covered and the facilities for loading and unloading simple and effective. A reduction plant should have suitable facilities for properly handling the garbage and the various products, for cleaning the premises and for ventilation, so that all nuisances may be reduced to a minimum.

An incinerating plant should have suitable facilities for conveying the refuse, for temporarily storing and for charging it, for burning it at a temperature not less than 1250° F., thereby destroying all odors and producing steam both for operating purposes and for revenue, and finally, in order here also, to reduce all possible nuisances to a minimum, suitable dampers and ventilating ducts should be provided to prevent the escape of smoke and dust into the building.

To ascertain the relative economy of the two systems we must reduce the cost to annual expenditures, which should include fixed charges, such as interest and depreciation, the cost of collection and delivery from the premises to the works, the cost of operating the works; and, finally, there should be included the credits for the value of the products, such as grease, tankage, steam, clinker, and land raising.

From the foregoing viewpoints, modern practice in garbage disposal appears at last to have reached a fairly satisfactory basis.

DISCUSSION.

Dr. Hutchinson. In the city of Westmount, with thirteen thousand population, we have an incineration plant that is operated in connection with an electric light plant, so that a profit is made out of the refuse by using it with fuel for running the latter. The plant has been running now for about three years, and we find that we get forty cents' worth of fuel out of every ton of refuse carried into that incinerator, so that instead of the refuse being a nuisance, as it is in many municipalities, and as it was formerly in our own city, it is utilized in effecting the saving just mentioned. Last year the corporation of Westmount received value to the extent of $5,730.00 for the refuse, but of course that amount did not cover the expense of the incinerator, nevertheless it was $5,730.00 to our advantage. Because of the large amount of coal used in running the electric light plant the refuse was burned at a very high temperature, 1700° F. or 1800° F. This had one good result; we did not have any disagreeable smell, and the people living near the plant made no complaints. This is an important feature, because in practically every town in which there is an incinerator, people have complained about the bad odor. Another good feature is this; the clinkers from the incinerator are used in the building of cement sidewalks. Last year we used some three thousand loads of these cinders or clinkers for this purpose. The combination of an electric light plant, owned by the corporation, with an incineration plant makes a profitable investment. I think we are ahead of Milwaukee. However, Milwaukee has an excellent plant and we feel gratified in thinking that it is the result of the work undertaken years ago by the members of this Association.

A Member. I wish to emphasize what Dr. Hutchinson has said about the utilization of refuse at lighting and heating plants. In the city of Minneapolis we are not only making electric light, but we also are furnishing heat. Our plant is so situated that we are making the experiment of heating and lighting all of the surrounding work-house buildings together with the tuberculosis hospital. This work is to be extended to other buildings which at the present time, are in process of construction in the city of Minneapolis, and it has been determined to place the hospitals for infectious diseases in the same locality so that they may utilize the heat and light which will be furnished by our plant.

MR. RUDOLPH HERING, New York, (closing the discussion). In reply to the remarks made by Dr. Hutchinson, I will say that the incinerator in Milwaukee has been arranged for the utilization of both steam and clinkers. Calculation shows that the garbage and refuse as delivered at the plant are capable of producing steam now going to waste to the value of about three thousand dollars per month. In England, in Germany and here, there are still differences of opinion as to how to best utilize the steam, because the incineration of the garbage is irregular, and so the quantity of steam varies during the day and with the seasons. Sunday there is none.

I am quite familiar with the Westmount plant; it has steam generated by supplemental furnaces fired with coal. At hours, days and seasons when the garbage does not furnish sufficient heat the coal fires are used to supply the deficiency and the entire city is lighted from this plant.

The same thing could be done in Milwaukee. There are also other ways to utilize the heat. Ice is being made by it in many cities of England. Sewage is pumped by it where there is also a coal fire to supply the steam when the garbage is insufficient, as in Westmount. In Milwaukee the steam from the incinerator will probably be utilized to replace the steam now generated from coal-fired furnaces for the purpose of flushing the Kinnickinnic River.

A STUDY OF THE VENTILATION OF SLEEPING CARS.*

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ABSTRACT†

The air supply of a car may be computed by determining the proportion of CO_2 in the air of the car. This computation is based upon the known facts that normal air contains approximately 4 volumes of CO_2 in 10,000, and that one individual will produce approximately 0.6 cubic foot of CO_2 per hour.

This study is based on some 2,000 determinations of CO_2. The more important findings are given below; they apply to running cars and to the main compartment at the ordinary breathing level. Part of these cars were ventilated in the ordinary way by the deck-sash method; the greater number were equipped with a device for removing air near the ceiling by exhaustion. Two general classes of conditions are therefore represented, which may be called: (1) natural ventilation; and (2) ventilation by exhaustion.

1. NATURAL VENTILATION. (THE DECK-SASH METHOD).

Natural ventilation is carried out: (a) through crevices about doors, windows, deck-sashes, etc.; (b) through open deck-sashes; (c) through open end doors to the vestibule, and (d) through open windows.

(a) When all the doors, windows and deck-sashes are kept closed, all the air that enters a car must find its way in through crevices. Twelve observations in seven cars were made under these conditions. The passengers varied from 6 to 16 and averaged 13.33; the CO_2 varied from 5.5 to 15 per 10,000 and averaged 8.33. By applying the proper method of computation to these averages it is found that 18,400 cubic feet of air per hour would be required to maintain the average contamination. The possibilities of unaided crevices are seen to be considerable.

(b) One hundred and fifty-three determinations of CO_2 were made in 44 cars having from one-fourth to all the deck-sashes open (average about one-half) and the doors and windows closed. Passengers varied from 4

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to 24 and averaged 15.05. The maximum CO_2 was 13 and the average 7.19 per 10,000. This average would be maintained in a car containing 15 people by 28,300 cubic feet of air per hour. The detailed figures show that the efficiency of ventilation is quite variable. At times air will enter through open decks at the rate of 100,000 cubic feet per hour; at other times these openings seem to furnish very little air to the breathing zone.

(c) Only two observations were made when all the deck-sashes were closed and an end door to the vestibule was open (the outside doors remaining closed). The passengers averaged 9.5 and the CO_2 5.75; and 32,000 cubic feet of air per hour would be required to maintain the average.

With from one-fourth to all the deck-sashes open (average about one-half) and a door open into the vestibule (both doors four times) forty-six observations were made in fifteen cars. Passengers varied from 4 to 16 and averaged 9.5. The maximum CO_2 was 8.5 and the average 5.40, requiring 40,700 cubic feet of air per hour.

(d) With open windows such a large volume of air enters the breathing zone of the running cars as to render the respiratory contamination almost undetectable. It is obvious that the air supply must be very large, and that ventilation as a problem in furnishing an adequate amount of fresh air to maintain chemical purity entirely disappears under these conditions.

2. VENTILATION BY EXHAUSTION. (THE EXHAUST METHOD).

Three groups of conditions in sleeping cars ventilated by the exhaust method may be considered: (a) with all doors and windows closed; (b) with end doors to the vestibule open; (c) with open windows.

(a) Two hundred and ninety-four observations were made in sixty-seven cars equipped with exhaust ventilators and having all doors and windows closed. Passengers varied from 8 to 24 and averaged 14.88. The CO_2 varied from 4.5 to 10 per 10,000, and averaged 6.20, being equivalent to an air supply of 40,600 cubic feet per hour. Decidedly more uniformity exists than in any of the preceding groups.

(b) Forty-eight observations were made in twelve cars equipped with exhaust ventilators and having an end door to the vestibule open. Passengers varied from 5 to 18 and averaged 14.48; the maximum CO_2 was 9 per 10,000 and the average 5.50; requiring 57,900 cubic feet of air per hour.

(c) With open windows and exhaust ventilators the large volume of air flowing into the car renders respiratory contamination practically undetectable, and the remarks made in this connection concerning cars without ventilators apply equally and even more forcibly here.

In these various conditions the comparative average efficiency of the ventilation of the breathing zone of running sleeping cars was found to be as follows:

	Cu. Ft. per Hour
1. Natural Ventilation (Deck Sash Method).	
a. Fully closed car	18,500
b. With open deck sash	28,300
c. With open end door (decks closed)	32,500
c. With open end door (decks open)	40,700
d. With open windows, more than	100,000
2. Exhaust Ventilation (the Exhaust Method).	
a. Fully closed car	40,600
b. With open end door	57,900
c. With open windows, more than	100,000

THE SLEEPING CAR BERTH.

In presenting the conditions of ventilation in the occupied sleeping car berth, the two classes of cars, (1) with natural ventilation, and (2) with exhaust ventilators, must again be presented separately.

1. In cars depending on natural ventilation, 320 determinations of CO_2 in the air of lower berths were made in twenty-one cars having all doors and windows closed, and having a portion of the decks open in all but two cars. From six to thirty samples were taken in a car. Each berth had one occupant. The proportion of CO_2 varied from 5 to 18 parts in 10,000 of the berth air; it averaged 8.32. The average CO_2 would be maintained by 1,389 cubic feet of air per berth per hour. The highest average CO_2 for the berths of any car was 9.78, which would be maintained by 1,038 cubic feet of air per hour; the lowest was 6.41, which would require 2,473 cubic feet per hour.

Forty-one determinations were made for the upper berths. The CO_2 varied from 4.5 to 18 and averaged 9.17 per 10,000, equivalent to an air supply of 1,161 cubic feet per berth per hour.

2. In the cars with exhaust ventilators 690 observations were made in the lower berths of forty-two cars having all doors and windows closed. From 4 to 48 samples were taken from each car. The CO_2 varied from 4.5 to 13.5 per 10,000 and averaged 6.96, equivalent to 2,027 cubic feet of fresh air per berth per hour. The highest average CO_2 for the berths of any car was 9.34 per 10,000, equivalent to 1,123 cubic feet per hour; the lowest was 5.38, equivalent to more than 4,000 cubic feet.

Fifty-three upper berth samples were taken in five cars. The CO_2 was from 4.5 to 10.5 and averaged 6.70 equivalent to 2,222 cubic feet of air per berth per hour. The highest average CO_2 for the upper berths of any car was 9.63, equivalent to 1,065 cubic feet of air; the lowest was 5.75, equivalent to nearly 3,500 cubic feet. By comparison with the

above, these figures would seem to indicate that the upper berth is better ventilated than the lower, but it is not so. One hundred and thirty-two lower berth samples were taken in these cars simultaneously with the taking of samples from the upper. The average CO_2 was 6.51 per 10,000 for the lowers against 6.70 for the uppers; and the air supply necessary to maintain these averages would be 2,391 for the lowers against 2,222 for the uppers. In each of the five cars the lowers averaged a trifle lower in CO_2, consequently higher in air supply, than the uppers in the same car. The difference is so slight, however, as to be practically negligible.

In each of the two classes of cars the CO_2 in air taken from the body of the car was, on the average, a little lower than in air from the berths. Reducing all observations to the same basis they may be compared as follows:

	Cu. Ft. per Hour
1. Natural Ventilation (Deck Sash Method).	
Body of car: CO_2=7.32; air supply to car	29,700
Lower berth: CO_2=8.32; air supply per berth	1,389
Upper berth: CO_2=8.73; air supply per berth	1,268
2. Exhaust Ventilators (the Exhaust Method).	
Body of car: CO_2=6.33; air supply to car	40,500
Lower berth: CO_2=6.96; air supply per berth	2,027
Upper berth: CO_2=7.19; air supply per berth	1,883

It was possible in only a few instances to compare these two types of cars when they were running on the same train, and consequently under nearly identical conditions of wind and pressure. The comparisons show essentially the same relation to exist as is shown in the above grouping.

INTERPRETATION.

The air supply of sleeping cars, especially of those equipped with exhaust ventilators, is adequate to maintain a sufficient degree of chemical purity. Those difficulties which arise are chiefly dependent upon improper regulation of temperature. It has been shown experimentally that the physical condition of the air—its temperature, humidity and motion— are of vastly more importance in maintaining comfort in occupied rooms than is the chemical condition of the air.

CONTRIBUTION TO THE STUDY OF BERIBERI.*

(Preliminary Note with some Conclusions.)

By Dr. MARIO G. LEBREDO,
Director of the Research Laboratory of the Health Department, Havana, Cuba.

Beriberi has been observed in Cuba on several occasions in epidemic form, as a result of conditions of depression and want, as, for instance, slavery, and the reconcentration of the rural population in the cities during the war of independence. There have been, on the other hand, cases that could not be connected with these causes.

It becomes every day more apparent, therefore, that we must differentiate between the essential form of beriberi, which is caused by starvation and which is a disease evidently akin to scurvy, and a true pseudo-beriberi, characterized by a polyneuritis similar anatomically with that of true beriberi, but differing in nature just as the epidemic anterior poliomyelitis differs from the affection produced by varied and well-known organisms.†

The cases recently observed by me in the Santa Clara jail were cases of acute beriberi in individuals accustomed to a fair and varied diet. The etiologic factor here was very virulent, since out of seven persons affected, four died with the striking phenomena of precordial angor, from cardiac dilatation, shown by the autopsy to have been very marked, and in one case accompanied with pericardial effusion to the amount of four hundred cubic centimeters.

Samples of the rice consumed in the jail showed it to be polished rice. A bacteriological study of these samples showed the presence of numerous spores capable of resisting the boiling temperature (100°C.) for twenty minutes. By the destruction in this wise of other saprophytic germs, the spores are left in pure culture. This highly amylolytic germ produces glucocides a few hours after the cooking of the rice. The germ produces also valerianic acid and probably butyric acid and low grade alcohols. These facts I consider important. The qualitative and quantitative analysis of these products is the subject of further investigations.

The spores in cooked rice are transformed in a few hours into long filaments which later form chains by dividing into sections three to five microns in length. This transformation into chains occurs in about two

* Read at 39th Annual Meeting of American Public Health Association, Havana, Cuba, Dec., 1911.
† Studies by Flexner.

days. Staining these forms by Gram, without washing in alcohol, they take the anilin dye completely, showing no amyloid reaction. On the third day or a little earlier, the elements take cigar-shaped, lanciform, or pipe-shaped forms such as are found in other diastastic bacteria described by Le Dantec in connection with certain organisms found in the feces of persons who died of beriberi. In their new form, the organisms give the amyloid reaction, with the exception of the new spore, which is generally at the end of the organism, and which takes the anilin dye, thus giving exactly the appearance of a lighted cigar.

The organism is essentially aerobic. This distinguishes it from other amylolytic organisms described as anaerobic by several authors. The resistance to heat above 80°C. distinguishes our organism from that of Le Dantec.

Boiled rice is the best culture medium. Damp rice sterilized under pressure is not a good culture medium, nor is any other amylaceous substance. Since the organism sporulates at once on agar, this is the best method of preserving cultures.

The liquid obtained from the cooking of this rice, in the proportion of one part of the grain to four of water, after boiling from fifteen to twenty minutes, becomes, from the first hours after the boiling, lethal to the rabbit and guinea-pig, when injected into the peritoneum in doses of sixteen cubic centimeters. These intraperitoneal injections cause death in from two and a half to six hours, and in almost all cases with the same symptoms. These begin half an hour after the injection and terminate with marked suffering from cardio-pulmonary symptoms.

The autopsies on the guinea-pigs always revealed dilatation of the right side of the heart, and sometimes of the left auricle; frequently also serous effusion in the pericardial and pleural sacs, as well as diffuse infiltration in extensive areas of the small intestines and the stomach; the peritoneum itself and other portions of the intestines remaining unaffected.

I have not yet made a study of the pneumogastric, phrenic, and diaphragmatic nerves, to disturbances of which I attribute the final symptoms. These are very similar to those encountered in acute beriberi of the cardio-pulmonary form.

Two other samples of rice from a different lot, obtained in Havana, and boiled in the same manner as above, and in which rice the spores and their derived forms could not be found, failed to produce any disturbances whatever, though the liquid was injected in larger doses, even to twenty cubic centimeters. I am sure that anaphylaxis has nothing to do with these phenomena. Doses of two, three, and four cubic centimeters, injected subcutaneously for many days, produced no immediate effects.

Special study is to be made of one case giving later manifestations. The same negative results have been obtained by intravenous injections in doses of two cubic centimeters.

The intradural injections are rapidly effective, especially if the cerebral substance be irritated by slight puncture. Very small doses of the rice water are then sufficient to cause death with the same manifestations as in those cases where injected in the peritoneal cavity.

The ingestion by the mouth gave no results in a guinea-pig fed for more than one month with rice which had been proven to be virulent by peritoneal injection. Doses of sixty, eighty, and more grams were thus given by the mouth without effect. No change was made in the ordinary feeding of the animals experimented upon. When the gastric mucous membrane was previously irritated, however, by administering six to eight cubic centimeters of water and alcohol, in equal parts, with three drops of hydrochloric acid for every ten of the mixture, and the animal allowed to recover completely from the manifestations of slight acute alcoholism, death was produced by the ingestion of ten cubic centimeters of the rice water, with the same symptoms as in the cases of peritoneal injections.

Do the experimental data above detailed warrant the assertion that the toxic substance produced in the infected rice acts solely by direct action upon the nerve elements? Is the previous irritation of the gastric mucosa necessary to set in motion this action through the digestive channel?

I have not been able yet to produce manifestations of chronic polyneuritis.

Without wishing to discuss, as yet, the phosphorus theory of the etiology of beriberi, I believe I am justified in pointing out the great analogy between the clinical facts and the experiments here detailed.

It has been my object, in presenting these notes before the American Public Health Association,* to stimulate, in the direction indicated, the studies on the etiology of beriberi in countries where the disease is pervalent, believing that the facts here recorded open the way to other and more complete experimental studies.

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* December, 1911.

Laboratory Section

LIVER BROTH.*

A Medium for the Determination of Gas Forming Bacteria in Water and Sewage.

(*Abstract.*)

By D. D. JACKSON and T. C. MUER,
Brooklyn, New York.

The determination of gas-forming bacteria in water and sewage by means of lactose bile gives results which represent the relative degree of dangerous contamination or that of recent origin. While of special value in judging the degrees of pollution present, it does not show the presence of gas-formers other than *B. coli* and does not often indicate *B. coli* when it is in an attenuated state.

For those observers who desire to determine the presence of all gas-formers (fermenting dextrose) at 37°C., and *B. coli* to the highest degree to which it is actually present, the authors have devised a medium giving quicker and higher results than dextrose broth, even after rejuvenation in nutrient broth. Its composition is as follows:

Beef Liver	500.0	grams
Peptone	10.0	"
Dextrose	10.0	"
Potassium Acid Phosphate	1.0	"
Water	1000.0	"

The medium is prepared in the following manner:

1. Chop 500 grams of beef liver into small pieces and add 1000 cc. of distilled water.

2. Boil slowly for two hours in a double boiler (starting cold), stirring it occasionally.

3. Make up loss by evaporation and strain through a coarse wire strainer.

* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

4. To the filtrate add ten grams of peptone, ten grams of dextrose, and one gram of potassium acid phosphate.

5. After warming this mixture in a double boiler and stirring for a few minutes to dissolve the ingredients, titrate with $\frac{N}{20}$ sodium hydroxide, using phenolphthalein as an indicator, and neutralize with normal sodium hydroxide.

6. Boil vigorously for thirty minutes in a double boiler, and five minutes over a free flame with constant stirring to prevent caramelization of the dextrose.

7. Make up loss by evaporation and filter through cotton flannel and filter paper.

8. Tube, and sterilize in an autoclave for fifteen minutes at 120°C. (15 lbs.)

It is very important to note that liver broth should not be exposed to the high temperature attained in the autoclave any longer than fifteen minutes, as prolonged heating above the boiling point causes caramelization of the carbohydrates, rendering the medium less delicate for bacterial development. The addition of small pieces of liver tissue, which have been sterilized in the autoclave, improves the rejuvenating properties of the medium. They should be added to the tubes after sterilization.

Bacterial growth being very rapid in this medium, preliminary rejuvenation at 37°C. should be concluded between six and twelve hours.

In the examination of water, dilutions of 0.1, 1.0 and 10 cc. of the sample may be inoculated into lactose bile and another series into liver broth.

Positive tests in the lactose bile indicate the degree of pollution with *B. coli.*

Gas formation in the liver broth indicates the degree of contamination with gas-forming bacteria both attenuated and virulent.

Transplanting within eighteen hours from the liver broth into a second set of lactose bile tubes gives a fairly accurate idea of the amount of attenuated *B. coli* present. Negative results in both sets of bile tubes, and positive results in the liver broth, usually show that the gas-producing bacteria present are not *B. coli.*

Other valuable liver media for work on bacterial species are prepared as follows:

LIVER GELATINE.

1. Proceed as in steps 1, 2, 3 in preparing liver broth.

2. Cool the filtrate to 50°C. add ten per cent. sheet gelatine, and stir a few minutes until dissolved.

3. Add one per cent. peptone, one per cent. dextrose, and one-tenth per cent. potassium acid phosphate.

4. Stir until ingredients are dissolved, keeping the temperature below 50°C. ,and then proceed as in steps 5, 6, 7, 8, in preparing liver broth.

LIVER AGAR.

(1 liter)

1. Chop 500 grams of beef liver into small pieces, add 500 cc. of distilled water, and boil slowly for two hours, stirring occasionally.

2. Add five grams of agar (dried at 105°C. for thirty minutes) to 500 cc. of distilled water and digest for thirty minutes in an autoclave at 120°C. (15 lbs.)

3. After making up loss by evaporation, strain the liver infusion through a coarse strainer, add the filtrate to the agar solution, and proceed as in steps 4, 5, 6, 7, 8, in preparing liver broth.

CLASSIFICATION OF THE B. COLI GROUP.*

By DANIEL D. JACKSON,†
New York City.

The term *B. coli* as an indication of fecal contamination in water and milk has been so often misapplied that the result has been much confusion and frequent misinterpretation of bacterial examinations.

It has been the custom of many bacteriologists to throw out of sanitary consideration all bacteria which do not absolutely conform to the so-called "typical" *B. coli.* There are many known varieties, all of fecal origin and closely related to typical *B. coli*, which will be described in this paper, and there probably exist many more varieties which will be discovered in the future. Any of these varieties, when they occur in water or milk, have a sanitary significance, and because of their close relationship, all should be included in the *B. coli* group.

The fermentative reactions have been chosen as a means of classification, not only because of the ease with which these organisms are thus separated from those of other groups, but because of the facility with which each variety may be separated from the others.

B. coli GROUP.

The general characteristics common to this group are:

Fermentation with gas production with dextrose and lactose, short bacilli with rounded ends, non spore forming, facultative anaerobic, give positive test with esculin, grow at twenty degrees on gelatine and at thirty-seven degrees on agar, non-liquifying in fourteen days on gelatine.

The group consists of four species:

B. communior, (Durham.)
B. communis, (Escherich.)
B. aerogenes, (Escherich.)
B. acidi-lactici, (Hueppe.)

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* Read before the Laboratory Section of the American Public Health Association, Milwaukee, September, 1910.

† Laboratory Division, Department of Water Supply, Gas and Electricity, New York City.

The relative frequency with which the species of the *B. coli* group have been isolated is shown below:

	MacConkey. No. of Strains from Feces		Graham-Smith. No. of Strains from Flies		Winslow & Walker No. of Strains from Feces	
B. communior	110	23%	15	43%	7	28%
B. communis	178	37%	6	17%	15	60%
B. aerogenes	72	15%	4	11%	1	4%
B. acidi-lactici	120	25%	10	29%	2	8%
	480	100%	35	100%	25	100%

The first two species are separated from the second two by their gas production with dulcite, and the first species of each of these two groups may be separated from the second by its gas production with saccharose.

Each of these species may be separated into four possible varieties in accordance with their gas production with mannite and raffinose. Two varieties of the third, and three of the first and fourth species are now known. All four possible varieties of the second group have been found. These varieties are classified by letters, as, for instance, *B. communis*, A, B, C and D. Under these varieties are classified subvarieties, as in the case of *B. communior*, A_1 and A_2.

Graphically, the separation of the known groups is brought about as follows:

B. COLI GROUP.

Dextrose+.
Lactose+.

Dulcite+.

B. communior.
B. communis.

Saccharose+.

B. communior.

Variety (A)1	Mannite +	Raffinose	+
" (A)2	" +	"	+
" (B)	" +	"	—
" (C)	" —	"	+
" (D)*	" —	"	—

Saccharose—.

B. communis.

Variety (A)	Mannite +	Raffinose	+
" (B)	" +	"	—
" (C)	" —	"	+
" (D)	" —	"	—

Dulcite—.

B. aerogenes.
B. acidi-lactici

Saccharose+.

B. aerogenes.

(A)1	Mannite +	Raffinose	+
(A)2	" +	"	+
(A)3	" +	"	+
(B)1	" +	"	—
(B)2	" +	"	—
(C)*	" —	"	+
(D)*	" —	"	—

Saccharose—.

B. acidi-lactici.

(A)1	Mannite +	Raffinose	+
(A)2	" +	"	+
(B)	" +	"	—
(C)*	" —	"	+
(D)	" —	"	—

+ Positive reaction.
— Negative reaction.
* Unknown.

In the above table twenty-one varieties of *B. coli* are given, four of which are as yet unknown. Out of the seventeen known varieties the author has cultures of fifteen. The other two, *B. communis* D, and *B. acidi-lactici* D, are described by Winslow & Walker[1].

It will be seen that the classification admits of indefinite expansion as other subvarieties are found. The following is a description of the characteristics of the known members of the *B. coli* group:

B. communior (DURHAM.)

VARIETY A_1. Fermentation with gas production with dextrose, lactose, dulcite, saccharose, mannite and raffinose. Milk coagulated, nitrate reduced, motile, indol positive.

Isolated by West of the Philadelphia Filter Laboratories from contaminated river water and checked by the author; also 7 strains isolated by Winslow from feces; by Dr. Avery of the Hoagland Laboratories, Brooklyn, from two cases of chronic cystitis and from an abscess associated with streptococci in a chronic case of cellulitis; also isolated by the author from contaminated water and from feces.

This appears to be the most common variety of *B. communior*. While raffinose determinations were not made, it is probably the same variety as isolated by MacConkey[2] in 110 strains and by Graham-Smith[3] in 15 strains taken from fecal matter.

VARIETY A_2. Fermentation the same as A_1. Motile, reduces nitrate. Differs from A_1 in not producing indol.

Isolated in three strains by Mr. Thomas W. Melia, of Mt. Prospect Laboratory, from human feces.

VARIETY B. Ferments with gas production with dextrose, lactose, dulcite, saccharose and mannite, but forms no gas with raffinose.

Also distinguished by not coagulating milk, even after heating, and by slow formation of gas in dulcite. In this latter test it usually takes three days for the gas formation to become active. Motile, indol positive, nitrate reduced.

Variety found by Melia, of Mt. Prospect Laboratory, Brooklyn; received from Dr. Avery, of the Hoagland Laboratories, Brooklyn, and isolated from urine from a case of cystitis.

VARIETY C. Fermentation with gas production with dextrose, lactose, dulcite, saccharose, and raffinose. Forms no gas with mannite. Milk coagulated, nitrate reduced, motile, indol positive.

Culture obtained from Dr. J. R. Fraser, McGill University, Montreal.

B. communis. (ESCHERICH.)

VARIETY A. Fermentation with gas production with dextrose, lactose, dulcite, mannite and raffinose. No gas formation with saccharose. Motile, indol slight, nitrate reduced.

Isolated by Currello, at the Bellevue Hospital. Isolated by Avery from a case of cystitis.

VARIETY B. Fermentation with gas production with dextrose, lactose, dulcite and mannite. No gas production with saccharose and raffinose. Milk coagulated, nitrate reduced, motile, indol positive.

This appears to be the most common variety of *B. communis.* Isolated by Avery and checked by the author, from a case of urinary cystitis; by Winslow from feces, and by the author from feces, water and milk.

VARIETY C. Fermentation with gas production with dextrose, lactose, dulcite and raffinose. No gas production with saccharose or mannite. Nitrate reduced, indol positive, motile.

Isolated by Winslow from feces. Isolated by Melia from Brooklyn water supply.

VARIETY D. Fermentation with gas production with dextrose, lactose, and dulcite. No gas production with saccharose, mannite or raffinose. Nitrate reduced, indol positive.

Isolated by Winslow from feces.

B. aerogenes. (ESCHERICH.)

VARIETY A_1. Fermentation with production of gas with dextrose, lactose, saccharose, mannite and raffinose. No gas production with dulcite. Indol positive, nitrate reduced, motility negative. Viscous growth on agar and in lactose bile. In the latter it can be drawn out into a long thin string.

Culture obtained by the author from Bellevue Hospital; also isolated by Dr. White of the Hoagland Laboratories from a urinary fistula, by Winslow from feces, and by the author from the Brooklyn water supply.

VARIETY A_2. Fermentations the same as A_1. Motile, indol negative, nitrate reduction positive. Differs from A_1 in producing growth less viscid or stringy when touched with the needle; in being motile and not producing indol.

Isolated by Avery from a case of chronic urethritis and from a case of cellulitis associated with *B. pyocyaneus* and *Streptococcus pyogenes aureus.*

After the identification of this variety, a vaccine was made which was specific for this particular variety of infection, whereas the vaccine previously made from *B. communis* B apparently had no curative effect.

VARIETY A_3. Fermentations and tests with one exception same as A_2.

Isolated from contaminated well water by Phelps and Hammond[4], Differs from A_2 in being slightly liquifying in gelatine stab after about twenty-six days. The total gas and percentage of CO_2 is high when grown in dextrose broth and particularly in liver broth. This species has been at times grouped with *B. cloacae* (Jordan), but the former never fails to produce gas with lactose, while typical *B. cloacae* apparently always gives negative results when dextrose-free lactose solutions are used. Another marked distinction is that true *B. cloacae*, after rejuvenation, is always strongly liquifying, while *B. aerogenes* A_3 never liquifies before twenty days, even after careful rejuvenation over long periods.

VARIETY B_1. Forms gas with dextrose, lactose, saccharose and mannite, but no gas with dulcite and raffinose. Non-motile, indol negative, nitrate reduced. Viscous growth on agar and in lactose bile. May be drawn out into a thin string by using a platinum needle.

Culture obtained from Kral's Laboratory; also isolated by the author from water and milk. This is probably the most common variety of *B. aerogenes*.

VARIETY B_2. Differs from B_1 in being motile, indol positive, and non-viscous in lactose bile.

Isolated by Melia in two strains from feces.

B. acidi-lactici. (HUEPPE.)

VARIETY A_1. Fermentation with gas production with dextrose, lactose, mannite and raffinose. No gas production with dulcite and saccharose. Non-motile, indol positive, nitrate reduction positive.

Isolated by Hueppe from milk.

VARIETY A_2. Fermentation same as A_1. Indol positive, nitrate reduction positive. Differs from A_1 in being motile.

Isolated by West from contaminated river water.

VARIETY B. Fermentation with gas production with dextrose, lactose, and mannite. No gas production with dulcite, saccharose, or raffinose. Milk coagulated, nitrate reduced, motile, indol positive. Isolated by Melia in nine strains from human feces, often exceeding in numbers all other varieties of bacteria in feces.

Culture also obtained from Dr. J. R. Fraser, McGill University, Montreal. This appears to be the most common variety of *B. acidi-lactici*.

VARIETY D. Gas production with dextrose and lactose. No gas production with dulcite, saccharose, mannite or raffinose. Indol positive, nitrate reduced.

Isolated by Winslow from feces.

The accompanying table shows the distinguishing characteristics which separate the individual members of the *B. coli* group. The unknown varieties indicated will probably be discovered later.

B. COLI GROUP.

	Dextrose	Lactose	Dulcite	Saccharose	Mannite	Raffinose	Motility	Indol	Nitrate Reduction	Liquifaction Gelatine in 14 Days	Coagulation of Milk
B. communior A_1	+	+	+	+	+	+	+	+	+	—	+
B. " A_2	+	+	+	+	+	+	+	—	+	—	+
B. " B	+	+	+	+	+	—	+	+	+	—	—
B. " C	+	+	+	+	—	+	+	+	+	—	+
B. " D*	+	+	+	+	—	—	..	..	..	—	..
B. communis A	+	+	+	—	+	+	+	Slight	+	—	+
B. " B	+	+	+	—	+	—	+	+	+	—	+
B. " C	+	+	+	—	—	+	+	+	+	—	+
B. " D	+	+	+	—	—	—		+	+	—	+
B. aerogenes A_1	+	+	—	+	+	+	—	+	+	—	+
B. " A_2	+	+	—	+	+	+	+	—	+	—	+
B. " A_3	+	+	—	+	+	+	+	—	+	positive after 26 days	+
B. " B_1	+	+	—	+	+	—	—	—	+	—	+
B. " B_2	+	+	—	+	+	—	+	+	+	—	+
B. " C*	+	+	—	+	—	+	..	..	..	—	..
B. " D*	+	+	—	+	—	—	..	..	..	—	..
B. acidi-lactici A_1	+	+	—	—	+	+	—	+	+	—	+
B. " A_2	+	+	—	—	+	+	+	+	+	—	+
B. " B	+	+	—	—	+	—	+	+	+	—	+
B. " C*	+	+	—	—	—	+	..	..	..	—	..
B. " D	+	+	—	—	—	—	..	+	+	—	+

+ Positive reaction.
— Negative reaction.
* Unknown varieties.

SUMMARY.

I. A study of this classification shows that thirteen out of seventeen known varieties of *B. coli* have been isolated from feces or diseased conditions; and that seven of these varieties have been isolated from water. Of the seven varieties isolated from water, four would conform to so-called "typical" *B. coli*, in spite of the fact that they are here grouped under three distinct species, *B. communior*, *B. communis*, and *B. acidi-lactici*. It is evident that the so-called typical *B. coli* does not exist as such, but that the entire group is typical of fecal contamination when water or milk examinations are to be considered.

II. All the known members of this group give positive gas tests with lactose bile, while no other known species gives such a test except *B. Welchii*, a pathogenic bacterium also of fecal origin. This may be readily distinguished from the *B. coli* group by its appearance under the microscope after growing in lactose bile, when long strings of bacteria considerably larger than those of the *B. coli* group are shown. Also unlike all members of the *B. coli* group, *B. Welchii* gives a negative test with esculin solution. It usually gives more rapid and active gas production in lactose bile than does *B. coli*. It is also distinguished by being an obligate anaerobe.

III. The importance of this classification from a medical point of view is shown by the fact that a vaccine made from *B. communis B* was not effective in cases of urethritis and cellulitis when the infection was from *B. aerogenes* A_2. It is evident that different members of the *B. coli* group may not be used indiscriminately for the production of vaccine, but that the variety of the *B. coli* causing the infection should be known and should be the one chosen for this purpose. The above classification readily facilitates the identification of any specific variety.

IV. The classification of bacteria into main groups, according to motility [5], [6] widely separates the most closely allied forms. Winslow[7] has discarded this classification for the coccaceae and called attention to the fact "that this property is not correlated with any other character—arising independently in forms exactly resembling non-motile forms in every other respect." Classification by motility would widely separate three of the varieties of *B. aerogenes* herein given from the other two known varieties whereas their descriptions show an unusually strong natural relationship. A classification based first on form and grouping of cells, second on the relation of their growth to air, third on their fermentive characteristics and, finally, on general cultural and morphological characteristics and biochemical reactions, would bring allied species and

varieties into closely related groups. Carrying out this idea the next group to be classified would be the facultative anaerobic bacilli which ferment dextrose with gas production but do not produce gas in lactose. Then would follow a classification into groups of those facultative anaerobic bacteria which produce acid but no gas when grown in the various sugar media. Just as in qualitative chemistry allied elements are brought together into groups by the reactions which they produce, so in qualitative bacteriology species and varieties having natural relationship may be brought together into groups by a classification based on their fermentative characteristics.

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Notes and Reviews*

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College, Boston, Mass.
(*Reviewer.*)

Emotion and Secretion. Everyone is familiar with the fact that the experience of any marked emotion is attended with characteristic innervations of the muscles, resulting in facial expressions and bodily postures more or less easily interpreted by a looker-on. These muscular contractions are usually regarded as the objective sign of what is felt by the subject, but we have lately become accustomed to the view that they are to a great extent the actual source of his feeling. This is the basis of what is known as the James-Lange theory of emotions. The contractile tissues involved in such responses to central disturbances include not merely the skeletal system, but the cardiac and the visceral muscles as well.

Physiologists have found that the efferent nerves are not limited in their scope to the control of contractile structures. Their fibres often terminate in connection with the cells of glandular epithelia, and over such cells the centers have a very positive influence. Secretory fibres have been demonstrated for the salivary glands, for the sweat glands, and for the glands which produce the gastric juice. Their existence for the tear glands scarcely calls for laboratory exposition. In the case of some organs yielding secretions we have less evidence of direct nervous regulation of the processes taking place in the cells. The liver and the kidneys are not so clearly under central government as are the glands just mentioned. Indirect control, through changes of blood-supply, is to be looked for in every instance.

Since the nervous system plays upon the glands, as well as upon the musculature of the body, it is probable that any widespread disturbance among its elements will affect the character and the amount of the secretions. This is not altogether a new idea. Sweating in fear and under other emotional conditions is familiar enough. Suppression of the flow of saliva seems to be common and is one of the occurrences which suggest that inhibitory as well as excitatory powers over glands are provided for.

*Editor's Note. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

Rather indefinite notions prevail that the composition of milk may be altered, and that it may even be made somewhat toxic as a result of distressing experiences. Recently we have been brought to see that further possibilities certainly exist. There are various organs which elaborate active products destined not to be discharged to the external surface of the body, nor into the lumen of the alimentary canal, but to blend with the circulating fluids. Such organs are said to form internal secretions and our appreciation of their influence is constantly widening. It is to be expected that the internal secretions, quite as distinctly as the external, will be found to be modified in amount, and perhaps in character, under the sway of changing central conditions. If these organs do not receive true secretory fibres they at least have vasomotor supplies through which the local activity may be intensified or reduced. Dr. W. B. Cannon, to whom we owe so large a share of our knowledge of the properties of the digestive tract, has now opened a new field full of promise and suggestion. He has shown decisively that, in one case at least, an active internal secretion is produced in increased amount under circumstances of emotional turmoil. It becomes reasonable to anticipate more disclosures of a similar sort.*

The secretion studied by Dr. Cannon is that of the adrenal body. This is a principle of such powerful drug-like characteristics that it is detectable in extremely small quantities. Any significant increase of it confers on the blood the property of causing vascular constriction, dilation of the pupil, and inhibition of intestinal peristalsis. It has been observed that these effects are all such as may be caused by stimulation of the sympathetic system. Furthermore it is true that all these, together with acceleration of the heart, another sympathetic symptom, form part of the picture of painful emotion. Dr. Cannon terrified a cat by holding it helpless in the presence of a barking dog. Samples of the blood of the cat taken after the ordeal and compared with those taken before, gave clear evidence of the addition of adrenalin under the stress of the trial.

Many interesting questions suggest themselves. Is such a production of adrenalin of service to an animal in an emergency? Has it any relation to the "strength of desperation" which is often so surprising a manifestation? Does its lingering in the circulation account for the after-effects of profound emotion which so greatly outlast the active phase? An attempt to discuss these questions would be premature. We need to know whether the thyroids and parathyroids, the pituitary body and other structures are similarly involved. But we can already realize more justly than we have yet done how far-reaching is the physical registration of the emotional process and how potent it must be for good and for evil.

*Cannon & De la Paz. Journal of the American Medical Association, 1911, LVI, p. 742.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Boston, Mass.

New Officers of the American Public Health Association. The following officers for the year 1912 were elected at the 39th Annual Meeting of the American Public Health Association held in Havana, Cuba, December 4 to 9, 1911.

President, Dr. J. N. Hurty, Indianapolis, Ind.; First Vice-President, Dr. Federico Torralbas, Havana, Cuba; Second Vice-President, Dr. A. J. Douglas, Winnipeg, Canada; Third Vice-President, Dr. Carlos M. Garcia, Vera Cruz, Mexico; Secretary, Dr. William C. Woodward,* Washington, D. C.; Treasurer, Dr. Frank W. Wright,* New Haven, Conn.

Place of meeting for 1912, Washington, D. C.

COMMITTEE OF SEVEN for 1912: The President and Secretary, *ex-officio*. Dr. R. M. Simpson, Dr. W. R. Batt, Dr. H. D. Holton, Dr. P. H. Bryce, Dr. G. T. Swarts.

JOURNAL COMMITTEE for 1912: The Executive Committee made the following changes in the Committee on Journal for the year 1912: Dr. Henry D. Holton, for unexpired term (one year) of Dr. H. W. Hill (resigned) Dr. Peter H. Bryce, (3 years) in place of Dr. E. C. Levy, (term expired.) The membership of the new Committee on Journal now stands as follows: The President and Secretary, *ex-officio*, and Dr. P. H. Bryce, Dr. G. T. Swarts, Dr. H. D. Holton.

Proposed Central Office and Executive Official for the A. P. H. A. Present Editor Retires: Mr. B. R. Rickards, whose term as Managing Editor of the Journal of the American Public Health Association expires with the present issue, has withdrawn his name unconditionally from further consideration for the position. The Committee on Journal, acting under instructions from the Executive Committee, proposes to combine the offices of Managing Editor, Secretary* and Treasurer*, and to open an office for the transaction of the business of the Association. A considerable saving in the expense of carrying on the work of the Association will undoubtedly be effected by the proposed consolidation. An adequate salary will be paid the officer selected.

*The present Secretary and Treasurer have both signified their desire to retire as soon as the new Editor-Secretary-Treasurer is appointed.

Report on the Investigation of Typhoid Cases at Walpole, Mass. Doctors and boards of health have been prone to regard sporadic cases of typhoid fever as of little public concern, but the recognition of the facility with which the disease is spread by contact is modifying their attitude and thorough investigation of such cases is becoming more common. Recently the Board of Health of Walpole, through its secretary, Dr. F. H. Fuller, employed Horatio N. Parker to search out the cause of six cases of typhoid fever that appeared from August 10 to October 5, 1911, in the adjoining cities of Walpole and Norwood, Massachusetts. The former of these cities has a population of 4,900 and the latter 8,000; both support manufacturing establishments and have small congested areas, but in the main the citizens are well to do and live in the comfortable way characteristic of small suburban communities. Typhoid fever in the two cities is so unusual that the occurrence of six cases at about the same time caused considerable gossip.

The public water supply of Walpole is derived from wells and is known to be pure; that of Norwood comes from surface sources and is believed to be wholesome, though there is some dissatisfaction with it owing to its color and high temperature in the summer time.

Mr. Parker's report to the Board takes up the cases chronologically. The first case was that of a young man who, in all likelihood, contracted the disease at a seaside resort from a young woman to whom he was attentive, and who was nursing a patient through typhoid fever. The cause of the second case was not definitely ascertained, but the patient stated that only sixteen days before the first symptoms of illness appeared, she had returned to Norwood from a long visit to a neighboring state. The third case apparently contracted the disease at a shore resort where the patient, a child of ten, ate clams that were dug and steamed by her parents. This resort is at the mouth of a heavily polluted river and shell-fish taken thereabouts are known to be unsafe to eat. Within eleven days after this child took to her bed the other cases appeared on the route of the dairyman who served the family of the child.

The typhoid fever cases on this milk route were the only ones that had occurred in Walpole in 1911, and the patients had neither been out of the city nor had they come in contact with anyone having the disease. Suspicion thus fell on the milk. Inspection of the farms where the milk was produced and of the dairy showed no sickness of any sort. Inquiry elicited the facts that on this dairy route milk was left in bottles at all of those families where typhoid fever developed, and that at a large club house and at a popular restaurant where milk was left in cans, there were no cases of typhoid fever among the members and patrons, though milk was freely drank at both places. It therefore seemed probable that the bottles of the dairyman had become infected from the first case on his route and that,

as the bottles were used over and over again without sterilization, they were carrying typhoid fever from customer to customer. The situation appeared similar to that which occurred in Montclair, N. J.* which was investigated and reported on by Mr. Parker. Accordingly the dairyman was instructed to sterilize all of his bottles in boiling water, which he did faithfully, and thereafter no new cases of typhoid fever appeared.

The Cholera Situation.† The number of cases of cholera reported in Italy and Russia has markedly decreased, as has also the number of localities from which the cases are reported.

Because of the improvement in the cholera situation abroad the following department circular has been issued, making the rule requiring the bacteriological examination of immigrants to determine the presence of cholera bacillus carriers apply only to immigrants arriving on cholera-infected vessels:

MODIFICATION OF DEPARTMENT CIRCULAR NO. 47.

TREASURY DEPT., OFFICE OF THE SECRETARY,
Washington, Nov. 16, 1911.

To National, State, and Local Quarantine Officers, Collectors of Customs, Shipowners and Agents, and others concerned:

Until further notice, Department Circular No. 47 of July 19, 1911, "Addition to Quarantine Regulations—Cholera Bacillus Carriers," is to apply only to infected vessels.

FRANKLIN MACVEAGH, *Secretary.*

Canada‡—Examinations for Cholera Carriers at Quarantine. The following circular in regard to the examination to be made at quarantine to detect the presence of cholera carriers among passengers coming from Italy has been issued by the Director General of the Public Health of Canada:

CIRCULAR TO QUARANTINE OFFICERS, THE COMMISSIONERS OF CUSTOMS, SHIPOWNERS AND AGENTS, AND OTHERS CONCERNED:

OFFICE OF THE DIRECTOR GENERAL OF PUBLIC HEALTH,
Ottawa, November 28, 1911.

SIR OR SIRS: In further reference to the subject of my circular letter of July 27 last, I am directed by the honorable the minister of agriculture to inform you that:

Until further notice, bacteriological examination of passengers from Italy suspected of being possible cholera carriers is to apply only to cholera-infected vessels.

The regulation stands that for all cholera contacts arriving on vessels upon which cholera has occurred, the period of detention under quarantine observation shall be 10 days, unless after 5 days' detention they are found not to be cholera-bacillus carriers.

I am, sir or sirs, your obedient servant,

F. MONTIZAMBERT, M. D.,
Director General of Public Health.

*Ninth Annual Report, Board of Health, Town of Montclair, N. J. 1903. Typhoid Fever: Whipple, p. 204. 1908.
†Public Health Reports, November 24, 1911.
‡Public Health Reports, December 8, 1911.

Pellagra.* A pellagra clinic was held November 2, at Columbia, S. C., under the auspices of the South Carolina State Board of Health. This makes the fourth annual clinic of this kind held at Columbia.

The following extracts are from a report on the clinic made by Past Assistant Surgeon, C. H. Lavinder:

"Among the papers presented, Dr. J. W. Babcock, in discussing the history of pellagra in South Carolina, read an abstract of a clinical report, and a case-history, taken from the records of the asylum for the year 1834. This case-record was in the handwriting of the superintendent of the asylum, Dr. Davis, and gave copious daily notes. After reading this case-history one could scarcely doubt that the physician was dealing with a case of pellagra. He himself spoke of the case as of scorbutic habit. Dr. Babcock was satisfied that the case could hardly have been anything else but pellagra, and expressed the opinion that a further search would undoubtedly show that pellagra had existed in the South Carolina State asylum since it was first opened in 1828.

"Mr. E. G. Watson, the South Carolina commissioner of agriculture, made a most interesting address on the spoiled corn problem in the South and especially in South Carolina. He has made an extensive study of the situation and he showed how very prevalent spoiled corn is in the markets of the South. He also expressed the opinion that spoiled corn is poisonous, and is unfit for consumption by either human beings or animals. This opinion was based upon careful laboratory work. He took the broad position that whatever be the cause of pellagra it was the duty of the State to protect its people against the sale of spoiled corn within its borders, since the use of such corn was a menace to public health. Under his energetic administration the State of South Carolina now has control of the sale of this product, and is vigorously enforcing the law against spoiled corn. South Carolina, he stated, is the only state in the Union which has such a control of the corn market."

Report of the Health Officer of the District of Columbia for 1910. This report contains much material not usually included in health reports and is well worth careful perusal. The reports of the divisions of the department follow the report in the form of appendices and include contagious diseases, the report of the chemist, dairy inspection, vital statistics and over 150 pages of laws and regulations relating to public health.

All phases of the different subjects are taken up and show the progress along sanitary lines in the District.

*Public Health Reports, November 24, 1911.

A New Course in Sanitary Engineering. In 1911–12 the Graduate School of Applied Science of Harvard University offers courses in sanitary engineering.

This new department is in charge of Prof. George C. Whipple, Mr. J. W. M. Bunker and Mr. M. C. Whipple. A complete chemical and biological laboratory has been installed with special equipment for studying the principles of water purification, stream pollution and sewage disposal, the disposal of wastes, etc., and opportunities are given for research in the field and in plants in operation. The work is intended primarily for graduate students in civil engineering, but courses will be arranged for candidates for the degree of Doctor of Public Health and for students desiring to take up the subject of municipal sanitation.

Sanitary Officers' Association of New York State. At the annual meeting of this Association, held October 24, at the Hotel Astor, New York City, the following officers were elected:

Frank Overton, M. D., Patchogue, President.
Louis M. Brown, M. D., Purdy's Station, First Vice-President.
Daniel S. Been, M. D., Binghamton, Second Vice-President.
Louis B. Couch, M. D., Nyack, Third Vice-President.
O. J. Hallenbeck, M. D., Canandaigua, Fourth Vice-President.
Wm. Stanton, M. D., Webster, Treasurer.
Montgomery E. Leary, M. D., Rochester, Secretary.

Over one hundred members were present. The practical side of the work was taken up and a committee appointed to coöperate with the State Department of Health to the end that proper revision of the sanitary laws may be secured.

Discrepancies in Kansas City Milk Report. In the Monthly Report of the Hospital and Health Board of Kansas City, Mo., for October, 1911, in an article entitled Milk Supply Comparisons,* the following statement appears: "During the month of October, 1911, 204 samples were taken for bacterial count of which two were less than 10,000, eleven were 10,000, sixty-five were above the ordinance requirements and only two reached the 5,000,000 mark." On page 7 under the city chemists report we find "Bacteria counts on milk samples 242" and below this "number of milk samples showing a higher bacteria count than permitted by ordinance." The first statement is thirty-eight short of the number reported by the chemist while the latter's table seems incomprehensible in view of a 5,560,000 count.

* Page 4.

BOOK REVIEW.

Insects and Disease. By Rennie W. Doane. New York: Henry Holt and Company, 1910.

This readable little book may be regarded as a popular introduction to a knowledge of its subject, written evidently by an entomologist rather than by a serious student of sanitary science, and correspondingly less helpful to one wishing to understand and apply effective measures of protection against communicable diseases, than to one interested mainly in a knowledge of the relation of insects to the spread of such diseases among mankind. Within its compass of 174 rather loosely printed pages, 21 of which are given to elementary generalities on parasitism and disease and on bacteria and Protozoa, it has, of course, been impossible to treat its extensive and complex subject in any other than a sketchy and somewhat superficial manner.

The author deals more or less adequately from his point of view with the agency of ticks, mites, bedbugs, fleas, and mosquitoes in the propagation of Texas fever, mange, anthrax, surra, and nagana in domestic animals; and spotted fever, relapsing fever, leprosy, itch, typhoid fever, cholera, tuberculosis, malaria, yellow fever, plague, sleeping sickness, elephantiasis, dengue, Mediterranean fever, kala-azar, and oriental sore among mankind. He also refers briefly to minor injuries and annoyances caused by horseflies, buffalo gnats, punkies, screw-worm flies, blow-flies, the "little housefly," bot-flies of horses and of sheep, warble flies, chigoes, and the Congo floor-maggot. About two-thirds of the space devoted to the proper subject of the work is very properly given to typhoid fever, malaria, yellow fever, and plague.

The author's style is simple and clear, and the text is well illustrated by numerous plates containing over a hundred figures, many of them half-tones made from original photographs. A rather unusual number of errors have escaped the notice of the proof-reader, such as the statement that some of the bacilli "are so small that they cannot be seen with the most powerful microscopes," the use of Amoeba for Amoebae and of animalculae for animalcules, and the inversion of the references to figures 76 and 77.

A well-selected bibliography of 46 pages is a valuable part of the book.

Stephen A. Forbes.

The House Fly—Disease Carrier. An Account of its Dangerous Activities and the Means of Destroying it. L. O. Howard, Ph. D. Frederick A. Stokes Co., New York, 1911.

This book meets a public need—and meets it well. During the last three years thousands of articles on the subject of the house fly as an enemy of human health have appeared in newspapers and magazines. These articles have served a good purpose in arousing public attention, but have been necessarily incomplete in their treatment of the subject and poorly adapted for permanent preservation. So it is a good thing that we now have this volume, which tells the whole story and puts into permanent form a mass of facts derived from hundreds of scattered sources.

The publishers invited the right man to write the book—a leader among investigators of the subject, and a writer who knows how to attract the attention of the reader and to hold his interest, while carrying out his serious purpose.

A wealth of important and interesting information is found in the discussion of the zoölogical position, life history, and habits of the house fly. On these topics the reader will find a reply to almost any question he is likely to ask.

The essential facts in regard to the natural enemies of the typhoid fly are concisely but adequately considered.

In seventy-five pages, the author summarizes, clearly and forcibly, the evidence that flies transmit certain diseases, particularly typhoid fever, cholera, dysentery, infantile diarrhoea, tuberculosis and anthrax. The most space is naturally given to the transmission of typhoid fever, the author wisely separating the inferential proof from the exact proof.

To say that the chapter on remedies and preventive measures is thorough and useful, would be but a feeble appreciation of the author's intense purpose to do his best to serve the public. His account of the disgusting, unsanitary conditions that prevail in agricultural communities, and that exist even in supposedly civilized cities, is only too true. He shows explicitly how to remedy these conditions, giving, for example, full plans and estimates for building a sanitary privy according to the ideas of Dr. Stiles. "It is believed that any fourteen-year-old school-boy of average intelligence and mechanical ingenuity can, by following these plans, build a sanitary privy for his home at an expense for building materials, exclusive of receptacle, of five to ten dollars, according to locality."

An unsanitary individual will not mend his ways, however, until he is impelled to do so from without. The incentive may be simply a few words in a book like this, or the opinion of a neighbor; but is more likely to be the organized effort of progressive members of a community who are able to keep the health officers alive to their duty.

Dr. Howard tells how to organize the work against the flies in towns and cities, and how to stir up the health officials, when necessary. He gives details of value to boards of health, and writes enthusiastically of successful efforts to enlist children in campaigns for public health in the face of the exasperating conservatism of their elders.

His bibliographical list of the most important articles on flies in relation to disease is a great convenience to those who wish to follow the subject beyond the limits of the book.

The author has grouped his facts in such a logical order, under numerous subheadings, that no index is necessary; the ample table of contents serves the purpose.

The publishers have done their part in first-class shape—as goes without saying. The price of the book ($1.60) puts it within general reach.

Few other authors could pack so much information into 312 pages without losing in intelligibility and attractiveness.

J. W. Folsom.

From the public health standpoint we believe the author has made a mistake in emphasizing the term "typhoid fly" throughout his book. The term "filth fly" suggested by Dr. Ch. W. Stiles, seems to us to be more accurate and proper. The author discusses at some length his selection of the term "typhoid fly" and defends

it on the ground that "overstatement to bring about a great sanitary reform may be justified so long as this overstatement is based on sound circumstantial evidence." Dr. Howard believes that "there is no way that the mortality rate of the country can be so rapidly decreased and *per contra* the health of the people so easily bettered as by reduction of the number of house flies to a negligible quantity" and so justifies the exaggerated term "typhoid fly" as a means "to frighten the ignorant and slothful and educate them on the fly question without creating a distaste for your methods and a consequent lack of helpful interest on the part of some who could be of the most valuable assistance."

Overstatement in the past in regard to well water as a means of spreading typhoid, and of dry dust as a means of spreading tuberculosis has, it seems to us, served to distract attention from the more obvious methods of transmission, namely direct, or very nearly direct, transmission of urine and feces from typhoid patients and the direct transfer of sputum, without drying, from person to person or by means of articles moistened with saliva which pass directly from mouth to mouth or from mouth to hand and from hand to mouth. We believe that the author of this book would do well to profit by these experiences.—[Ed.]

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CONTINUING THE

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CONTENTS